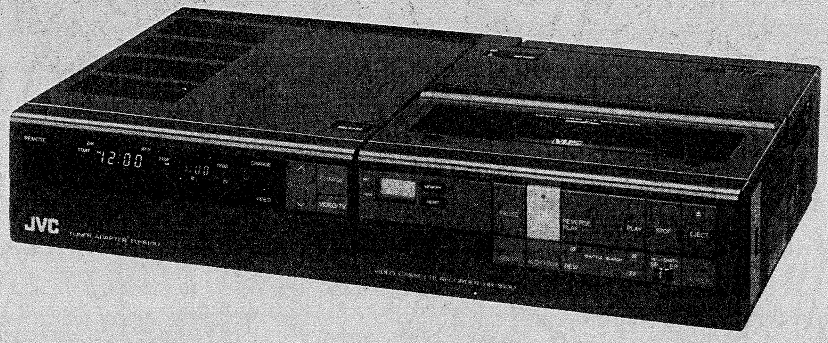
JVC

SERVICE MANUAL

VIDEO CASSETTE RECORDER VHS PAL

HR-S10EG/EK TU-S10EG/EK



SPECIFICATIONS (HR-S10EG/EK)

Format : VHS PAL standard
Recording system : Rotary, slant azimuth two-head helical scan system
Video signal system : PAL-type colour and CCIR monochrome signal
Tape width : 12.65 mm
Tape speed : 23.39 mm/sec.
Maximum recording time : 240 min. with JVC E-240 video cassette
Temperature
  Operating : 0°C to 40°C
  Storage : −20°C to 60° C
RF output signal : UHF channels 36 – 40 (adjustable, preset to UHF channel 36 when shipped)
Power consumption : 6 W (16 W with camera)
Power requirement : 12 V
Camera connector output : 12 V , 10 W maximum

Video
  Input : 0.5 to 2.0 Vp-p, 75 ohms, unbalanced (using the provided dubbing connector)
  Output : 1.0 Vp-p, 75 ohms, unbalanced (using the provided dubbing connector)
  Signal-to-noise ratio : 43 dB (Rohde & Schwarz noise meter)
  Horizontal resolution : More than 250 lines

Audio
  Input : Microphone: −67 dBs, 10 k-ohms, unbalanced
  Line: −20 dBs, 50 k-ohms, unbalanced (using the provided dubbing connector)
  Output : Earphone: Mini-jack
  Line: −6 dBs, 1 k-ohm, unbalanced (using the provided dubbing connector)
  Signal-to-noise ratio : More than 40 dB
  Frequency range : 70 Hz to 10,000 Hz
Dimensions : 204(W) x 80(H) x 225(D) mm
Weight : 2.4 kg

Provided accessories
- Aerial cable x 2
- Shoulder strap
- Antenna selector
- Dubbing connector
- Connector cover
- Dummy battery
- Video cassette

Optional accessories
- TU-S10EK/ES/EG Tuner/adapter
- NB-P4U High-capacity battery pack (1.2 AH)
- NB-P3U Regular battery pack (0.75 AH)
- BB-P3EK/EG Battery charger
- AC-P3EK/EG AC power pack
- AP-P3E Car battery adapter
- CB-P10U System carrying case
- CB-P11U Carrying bag (for outdoor shooting)
- Video cassette

E. & O. E. Design and specifications subject to change without notice.

No. 8370
November 1984

SPECIFICATIONS (TU-S10EG/EK)

(TU-S10EG)

General

Power requirement : 220 V∿, 50/60 Hz
Power consumption : 29 W
Weight : 3.0 kg
Dimensions : 223(W) x 76.5(H) x 256(D) mm
Temperature
  Operating : 5°C to 40°C
  Storage : -20°C to 60°C

Tuner section

Channel coverage : VHF band I, 47 – 118 MHz
VHF band III, 118 – 300 MHz
UHF band IV/V, 470 – 862 MHz

When combined with HR-S10EG:
Video line input : 0.5 to 2.0 Vp-p, 75 ohms unbalanced
Video line output : 1.0 Vp-p, 75 ohms
Audio line input : -20 dBs, 50 k-ohms, unbalanced
Audio line output : -6 dBs, 1 k-ohm, unbalanced

Timer section

Clock/timer indication : 24-hour fluorescent digital indication
Clock reference : Quartz controlled
Timer start setting : Within 2 weeks
Programming capacity : 8 programmes

AC power adapter/charger section

Rated output voltage : 12 V ⎓
Rated output current : Less than 1.3 A (adapter mode)
Battery pack to be charged : Exclusive Ni-Cad battery pack, NB-P4U/NB-P3U
Charging indicator : Provided

Provided accessories

Infrared remote control unit
"R6"-size battery x 2

Design and specifications subject to change without notice.

(TU-S10EK)

General

Power requirement : 220 V∿, 50/60 Hz
Power consumption : 29 W
Weight : 3.0 kg
Dimensions : 223(W) x 76.5(H) x 256(D) mm
Temperature
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Tuner section

Channel coverage : UHF band IV/V, channels 21 – 69

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Video line input : 0.5 to 2.0 Vp-p, 75 ohms unbalanced
Video line output : 1.0 Vp-p, 75 ohms
Audio line input : -20 dBs, 50 k-ohms, unbalanced
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Charging indicator : Provided

Provided accessories

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"R6"-size battery x 2

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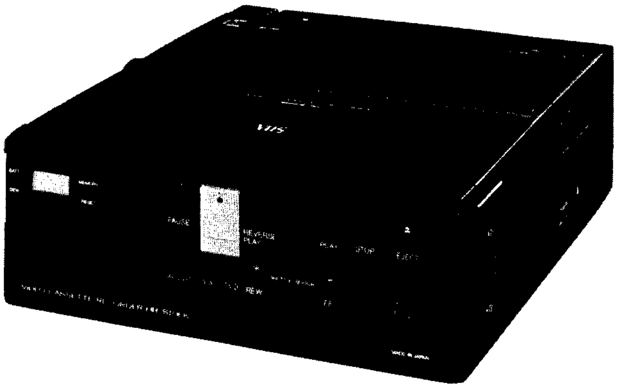
VIDEO CASSETTE RECORDER VHS

HR-S10EG/EK



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Input	Microphone: –67 dBs, 10 k-ohms, unbalanced Line: –20 dBs, 50 k-ohms, unbalanced (using the provided dubbing connector)
Output	Earphone: Mini-jack Line: –6 dBs, 1 k-ohm, unbalanced (using the provided dubbing connector)
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Shoulder strap
Antenna selector
Dubbing connector
Connector cover
Dummy battery
Video cassette

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NB-P3U Regular battery pack (0.75 AH)
BB-P3EK/EG Battery charger
AC-P3EK/EG AC power pack
AP-P3E Car battery adapter
CB-P10U System carrying case
CB-P11U Carrying bag (for outdoor shooting)
Video cassette

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Important Safety Precautions

Prior to shipment from the factory, JVC products are strictly inspected to conform with the recognized product safety and electrical codes of the countries in which they are to be sold. However, in order to maintain such compliance, it is equally important to implement the following precautions when a set is being serviced.

● Precautions during Servicing

1. Locations requiring special caution are denoted by labels and inscriptions on the cabinet, chassis and certain parts of the product. When performing service, be sure to read and comply with these and other cautionary notices appearing in the operation and service manuals.

2. Parts identified by the ⚠ symbol and shaded (▨) parts are critical for safety.
   Replace only with specified part numbers.
   Note: Parts in this category also include those specified to comply with X-ray emission standards for products using cathode ray tubes and those specified for compliance with various regulations regarding spurious radiation emission.

3. Use specified internal wiring. Note especially:
   1) Wires covered with PVC tubing
   2) Double insulated wires
   3) High voltage leads

4. Use specified insulating materials for hazardours live parts. Note especially:
   1) Insulation Tape
   2) PVC tubing
   3) Spacers
   4) Insulation sheets for transistors

5. When replacing AC primary side components (transformers, power cords, noise blocking capacitors, etc.) wrap ends of wires securely about the terminals before soldering.

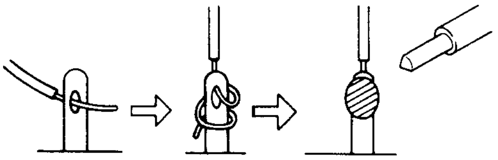

Fig. 1

6. Observe that wires do not contact heat producing parts (heatsinks, oxide metal film resistors, fusible resistors, etc.)

7. Check that replaced wires do not contact sharp edged or pointed parts.

8. When a power cord has been replaced, check that 10–15 kg of force in any direction will not loosent it.

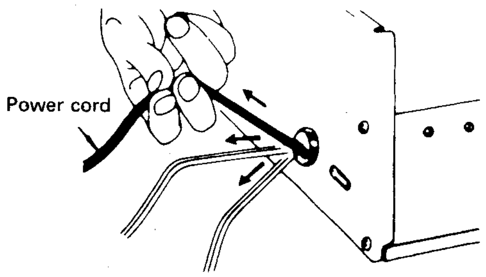

Fig. 2

9. Also check areas surrounding repaired locations.

10. Products using cathode ray tubes (CRTs)
    In regard to such products, the cathode ray tubes themselves, the high voltage circuits, and related circuits are specified for compliance with recognized codes pertaining to X-ray emission. Consequently, when servicing these products, replace the cathode ray tubes and other parts with only the parts specified. Under no circumstances attempt to modify these circuits. Unauthorized modification can increase the high voltage value and cause X-ray emission form the cathode ray tube.

11. Crimp type wire connector
    In such cases as when replacing the power transformer in sets where the connections between the power cord and power transformer primary lead wires are performed using crimp type connectors, if replacing the connectors is unavoidable, in order to prevent safety hazards, perfomr carefully and precisely according to the following steps.
    1) **Connector part number :** E03830-001
    2) **Required tool :** Connector crimping tool of the proper type which will not damage insulated parts.
    3) **Replacement procedure**
       (1) Remove the old connector by cutting the wires at a point close to the connector.
       Important : Do not reuse a connector (discard it).

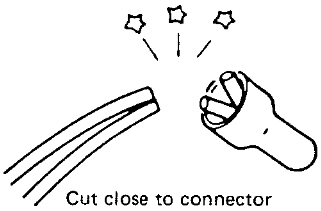

Fig. 3

(2) Strip about 15 mm of the insulation from the ends of the wires. If the wires are stranded, twist the strands to avoid frayed conductors.

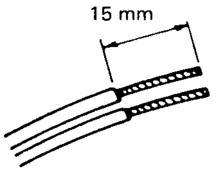

Fig. 4

(3) Align the lengths of the wires to be connected. Insert the wires fully into the connector.

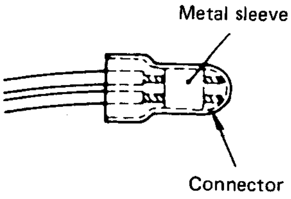

Fig. 5

(4) As shown in Fig. 6, use the crimping tool to crimp the metal sleeve at the center position. Be sure to crimp fully to the complete closure of the tool.

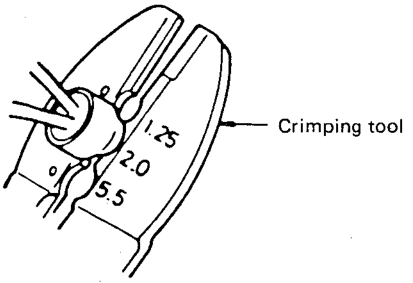

Fig. 6

(5) Check the four points noted in Fig. 7.

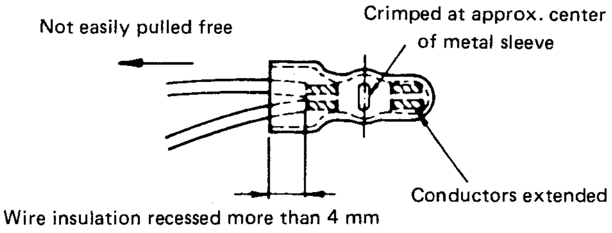
Not easily pulled free
Crimped at approx. center of metal sleeve
Conductors extended
Wire insulation recessed more than 4 mm

Fig. 7

● Safety Check after Servicing

Examine the area surrounding the repaired location for damage or deterioration. Observe that screws, parts and wires have been returned to original positions, Afterwards, performe the following tests and confirm the specified values in order to verify compliance with safety standards.

1. **Insulation resistance test**
   Confirm the specified insulation resistance or greater between power cord plug prongs and externally exposed parts of the set (RF terminals, antenna terminals, video and audio input and output terminals, microphone jacks, earphone jacks, etc.). See table below.
2. **Dielectric strength test**
   Confirm specified dielectric strength or greater between power cord plug prongs and exposed accessible parts of the set (RF terminals, antenna terminals, video and audio input and output terminals, microphone jacks, earphone jacks, etc.). See tabel below.
3. **Clearance distance**
   When replacing primary circuit components, confirm specified clearance distance (d), (d') between soldered terminals, and between terminals and surrounding metallic parts. See table below.

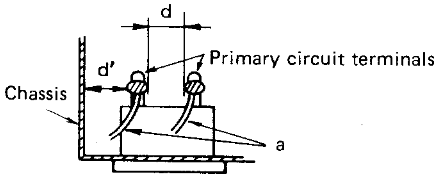

Fig. 8

4. **Leakage current test**
   Confirm specified or lower leakage current between B (earth ground, power cord plug prongs) and externally exposed accessible parts (RF terminals, antenna terminals, video and audio input and output terminals, microphone jacks, earphone jacks, etc.).

   Measuring Method: (Power ON)
   Insert load Z between B (earth ground, power cord plug prongs) and exposed accessible parts. Use an AC voltmeter to measure across both terminals of load Z. See figure and following table.

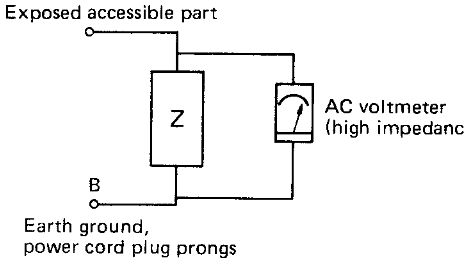

FIg. 9

AC Line Voltage	Region	Insulation Resistance	Dielectric Strength	Clearance Distance (d), (d')
100 V	Japan	≧ 1 mΩ/500 V DC	1 kV 1 minute	≧ 3 mm
110 to 130 V	USA & Canada	–	900 V 1 minute	≧ 3.2 mm
*110 to 130 V 200 to 240 V	Europe Australia	≧ 10 mΩ/500 V DC	4 kV 1 minute	≧ 6 mm (d) ≧ 8 mm (d') (a: Power cord)

*Class Ⅱ model only.

Table 1 Ratings for selected areas

AC Line Voltage	Region	Load Z	Leakage Current (i)	Earth Ground (b) to:
100 V	Japan	1 kΩ	i ≦ 1 mA rms	Exposed accessible parts
110 to 130 V	USA & Canada	0.15 μF 1.5 kΩ	i ≦ 0.5 mA rms	Exposed accessible parts
110 to 130 V 220 to 240 V	Europe Australia	2 kΩ	i ≦ 0.7 mA peak i ≦ 2 mA dc	Antenna earth terminals
		50 kΩ	i ≦ 0.7 mA peak i ≦ 2 mA dc	Other terminals

Table 2 Leakage current ratings for selected areas

Note: This table is unofficial and for reference only. Be sure to confirm the precise values for your particular country and locality.

HR-S10EG/EK

INSTRUCTIONS

Thank you for purchasing the JVC HR-S10EG Video Cassette Recorder. It is an ultra-small, lightweight recorder, conforming to the VHS format. Combine with a JVC video camera to record live events anywhere, or combine with the matching TU-S10EG Tuner/Adapter (optional) to record TV programmes. Connection to the TU-S10EG is cable-less and very easy; a single action is all that is necessary to connect or disconnect the two units.

To obtain the best performance and greatest utilisation from your HR-S10EG, read this instruction booklet carefully and completely.

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WARNING

This set is for exclusive use with the PAL color system.
Connect a video camera built to the PAL standard. (EK only)

WARNING

1. This set is for exclusive use with the PAL color system (system B and G).
2. SECAM (system B and G) colour programmes might be recorded in certain areas but there is no interchangeability of these recorded cassette tapes with other PAL-VHS recorder or SECAM-VHS recorders.
3. Please use the exclusive SECAM-VHS recorder in SECAM broadcasting areas.
4. Please use only PAL prerecorded cassette tapes or PAL signals which have been recorded with the PAL-VHS system.
5. For camera recording connect a video camera built to the PAL standard. (EG only)

WARNING:
TO PREVENT FIRE OR SHOCK HAZARD, DO NOT EXPOSE THIS UNIT TO RAIN OR MOISTURE.

NOTE:
The rating plate (serial number plate) and the safety caution are on the bottom of the unit.

WARNING: It may be unlawful to record or play back copyright material without the consent of the copyright owner.

VHS
PAL

Only cassettes marked "VHS" can be used with this video cassette recorder.

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Printed in Japan

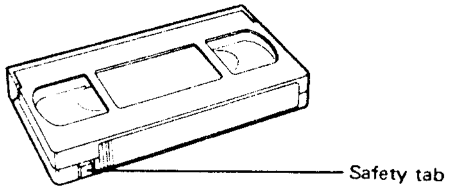
FEATURES

- Extremely compact and lightweight, easy to use video cassette recorder built to the VHS format.
- Flexible three-way power supply arrangement – exclusive Ni-Cad rechargeable battery pack, household AC and car battery.
- Feather-light touch pushbutton operation due to microprocessor-based full logic tape control.
- Direct cable-less connection to the matching TU-S10EG/EK tuner with a single action.
- The infrared remote control unit (provided with the TU-S10EG/EK controls both units (HR-S10EG/EK and TU-S10EG/EK when they are connected.
- Shuttle search for quick picture search in both directions at about 9 times normal speed in either direction.
- Automatic backspace editing control system to minimise picture distortion between separately recorded segments.
- Simplified insert editing function permits new segments to be inserted on a pre-recorded tape with minimum distortion.
- Audio dubbing facility provided to record soundtrack on pre-recorded tapes.
- May be connected to most TV receivers due to the built-in RF converter.
- LCD (Liquid Crystal Display) tape counter with memory function.
- Recording standby mode lock circuit for clean assemble edits even after a power cut.
- Reverse playback at normal speed, plus still picture and still-picture advance playback.
- Automatic quick review function automatically displays the last second of the recording in the camera's viewfinder when the pause button is pressed during camera recording.
- Tape-to-tape dubbing either through the TU-S10EG's relevant connectors or using the provided dubbing connector.

PRECAUTIONS

Handling and storage

- Prevent inflammables, water and metallic objects from entering the unit.
- Do not disassemble or remodel the unit, as this will cause danger and malfunctioning.
- Do not use the unit when it is lightning in the vicinity and exercise special care not to allow the unit to become wet when shooting outdoors on rainy days.
- Do not place heavy objects on the unit.
- Do not apply shocks to the unit.
- Do not subject the unit to direct sunlight or place it near a heater for a long period of time, otherwise the cabinet may become deformed or the internal electronic components such as transistors may be damaged. Pay special attention to rising temperature in closed cars on hot summer days; the temperature in closed cars sometimes reaches as high as 80°C.
- Avoid using the unit under the following conditions:
  - Extremely hot or cold places
  - Near appliances generating strong magnetic fields
  - Moving from a cold to a warm place
  - Places subject to excessive humidity, dust or vibrations.



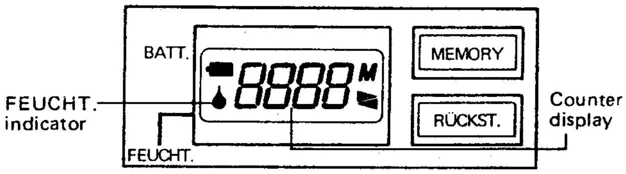
Video cassettes

- The HR-S10EG/EK employs VHS-type cassettes only: E-240 for 4 hours, E-180 for 3 hours, E-120 for 2 hours, E-60 for 1 hour and E-30 for 30 minutes of recording.
- Video cassettes are equipped with a safety tab to prevent accidental erasure. When the tab is removed, recording cannot be performed. If you wish to record on a cassette whose tab has been removed, use adhesive tape to reseal the slot.

- Do not load and unload a video cassette successively without allowing the tape to run. This may slacken or damage the tape.
- An inverted cassette cannot be inserted.
- Do not touch the tape directly.
- Do not disassemble the video cassettes.
- Avoid exposing the cassettes to direct sunlight. Keep them away from heaters.
- Avoid extreme humidity, violent vibrations or shocks, strong magnetic fields (near a motor, transformer or a magnet) and dusty places.
- Place the cassettes in cassette cases and position them vertically.

Moisture condensation

- If you pour a cold liquid into a glass, water vapor in the air will condense on the surface of the glass. This is called moisture condensation.
- Moisture condensation on the head drum, one of the most crucial parts of the video recorder, will cause damage to the tape.
- Moisture in the air will condense on the recorder when you move it from a cold place to a warm place, after heating a cold room or under extremely humid conditions.
- The recorder is equipped with a moisture condensation prevention circuit which automatically heats the head drum according to the ambient temperature. In order for this circuit to operate, connect the TU-S10EG/EK Tuner/Adapter to the recorder, plug the tuner's power cord into an AC outlet, set the POWER/BETRIEB switch to ON/EIN, and leave the recorder's POWER/BETRIEB button in the OFF position.
- The DEW/FEUCHT. indicator of the recorder informs you that moisture has condensed inside the recorder. As long as this indicator remains flashing, the recorder cannot be operated.



- If this dew warning indication should happen when you have powered the recorder, the power is automatically switched off. In this case you must wait for a few hours until the indicator no longer flashes when power is reapplied.
- The moisture condensation prevention circuit consumes only a slight amount of power. However, if for some reason you are not using the system for a long period of time, it is advisable to remove the power cord from the AC outlet.

Maintenance

- When the cabinet is dusty, clean by gently wiping it with a soft cloth.
- Avoid the use of strong cleaning agents such as benzine or alcohol as they may damage the cabinet.

IMPORTANT INFORMATION ON USING THE HR-S10EG

Power supply

- Use the NB-P4U (high-capacity) or NB-P3U (regular) exclusive battery pack for battery operation.
- Use the TU-S10EG/EK Tuner/Adapter or the AC-P3EG/EK AC Power Pack for AC operation.
- Use the AP-P3E Car Battery Adapter to obtain power from the car battery.
- When changing the power supply from the TU-S10EG/EK to other power units (battery pack, AC power pack, car battery adapter), press the POWER/BETRIEB button to OFF and disconect from the TU-S10EG/EK.

Notes:

- If the POWER/BETRIEB button fails to switch power on or off in case the TU-S10EG/EK is used, unplug the AC power cord and, after a few seconds, plug it in once again.
- If the POWER/BETRIEB button fails to switch power on or off in case a power supply unit is used instead of the TU-S10EG/EK, remove the power supply unit and, after a few seconds, attach it once again.

Priority of input signals

The HR-S10EG/EK is not provided with an input select switch. So that you can record the specific source you intend, please refer to the following chart depending on the situation.

Video input signal priority

Video source	Priority
Camera	1
TU-S10EG/EK or its video input (VIDEO EINGANG) (in use as a single-piece system)	2
VIDEO EINGANG of the dubbing connector (in use as a separate unit)	

*Depends on the setting of the uner's INPUT SELECT/EINGANGS-WAHL switch.

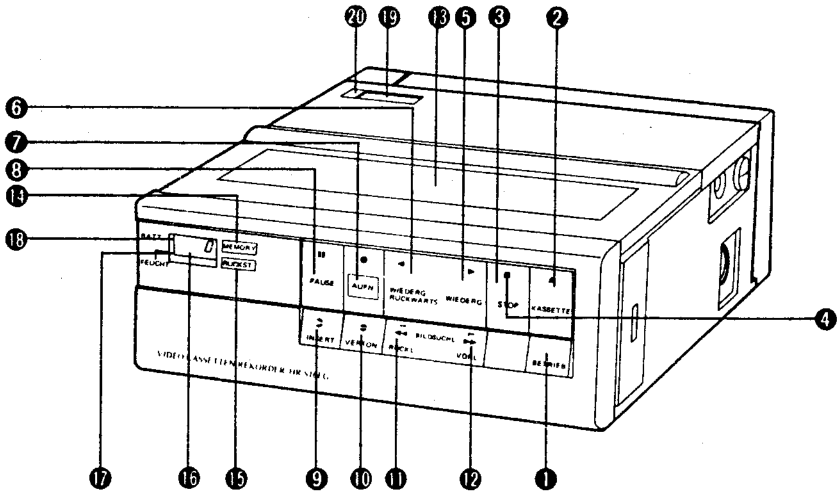
Audio input signal priority

Audio source	Priority
Microphone	1
Camera's external microphone	2
Camera's built-in microphone	3
TU-S10EG/EK or its AUDIO* (in use as a single-piece system)	4
AUDIO of the dubbing connector (in use as a separate unit)	

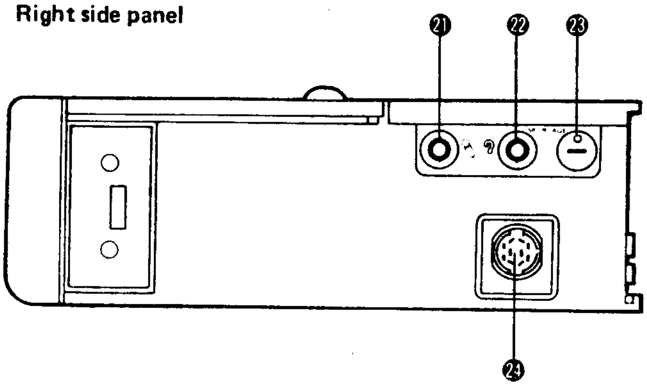
*Depends on the setting of the tuner's INPUT SELECT/EINGANGS-WAHL switch.

- When you record TV programmes (both video and audio) from the tuner, nothing should be connected to the CAMERA/KAMERA connector or the microphone jack. Moreover, be sure to set the INPUT SELECT/EINGANGS-WAHL switch of the tuner to TU.

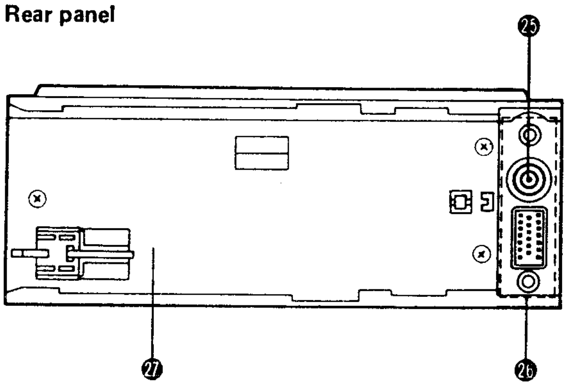
CONTROLS, INDICATORS AND CONNECTORS


20
19
13
5
3
2
6
7
8
14
18
4
17
16
15
9
10
11
12
1
BATT
FEUCHT
MEMORY
RÜCKST
PAUSE
AUFN
WIEDERG RÜCKWÄRTS
WIEDERG
STOP
KASSETTE
INSERT
VERTON
BILDSUCHL
RÜCKL
VORL
BETRIEB

Right side panel



Rear panel



❶ **Power button (BETRIEB)**
Press to apply power to the recorder. The STOP indicator will light when power is switched on.

❷ **Cassette eject button (KASSETTE)**
Press for insertion or removal of the cassette, and the cassette housing will lift. The KASSETTE button functions only in the Stop mode with the STOP indicator lit.

❸ **STOP button**
To stop the tape.

❹ **STOP indicator**
Lights in the Stop mode; also serves as a power indicator.

❺ **Play button (WIEDERG.)**
Press to play back the tape or cancel the Pause mode. Also press this button together with the AUFN. button ❼ for recording or with VERTON. button ❿ for audio dubbing.

❻ **Reverse play button (WIEDERG. RÜCKWÄRTS)**
To play back the tape in the reverse direction at the normal speed.

❼ **Record button (AUFN.)**
Press together with the WIEDERG. button ❺ for video and audio recording.

⑧ **PAUSE button**
Press to stop the tape temporarily to avoid recording of unwanted material or to view a still picture. The still picture can be advanced each time this button is pressed. Holding the button pressed in the Play mode continuously advances the still picture.

⑨ **INSERT button**
Press this button for insert editing. See pages 21 and 22.

⑩ **Audio dub button (VERTON.)**
Press this button together with the WIEDERG. button ❺ for audio dubbing. For more information see page 23.

⑪ **Rew/shuttle search button (RÜCKL./BILDSUCHL.)**
To rewind the tape, press this button while in the Stop mode. To view the speeded-up picture in the reverse direction for programme search, hold this button pressed while in the Play or Reverse Play mode.

⑫ **FF/shuttle search button (VORL./BILDSUCHL.)**
To fast forward the tape, press this button while in the Stop mode. To view the speeded-up picture in the forward direction for programme search, hold this button pressed while in the Play or Reverse Play mode.

⑬ **Cassette housing**
When the EJECT/KASSETTE button is pressed, the cassette housing lifts.

⑭ **MEMORY button**
For automatic tape indexing in conjunction with the tape counter. When this button is pressed, "M" appears in the tape counter display. In this state, the tape will stop automatically in the Rewind and Fast Forward modes near the counter reading of "0". To cancel the memory function, press the MEMORY button once again.

⑮ **Reset button (RÜCKST.)**
Press to reset the tape counter to "0".

⑯ **Tape counter**
Displays from "0" to "9999" as the tape runs. The tape direction indicator at the lower right-hand corner of the display (" ▶ " for forward or " ◀ " for reverse) shows the direction of tape running. In the Memory counter mode, "M" appears at the upper right-hand corner.

⑰ **Condensation indicator (FEUCHT.)**
When moisture has condensed inside the unit, this indicator flashes. See page 3.

⑱ **Battery power warning indicator (BATT.)**
This indicator flickers to warn of insufficient battery power. See page 7.

⑲ **Power unit release button (BATT.)**
Press this button to remove the attached battery pack, AC power pack or car battery adapter.

⑳ **RF output channel adjustment screw cover**
Open this cover by sliding it when resetting of the RF output channel is required. See page 36.

㉑ **Microphone jack (🎤)**
Connect a microphone for sound recording.

㉒ **Earphone jack (👂)**
Connect an earphone for monitoring the sound during audio dubbing, camera recording or for private listening.

㉓ **Tracking control (SPURLAGE)**
Use this control to minimise noise bars, if observed, during playback.

㉔ **Camera connector (KAMERA)**
Connect a JVC video camera directly to this connector using a 10-pin camera cable. (The camera's power consumption should not exceed 10 watts.)

㉕ **RF output connector**
Video and audio signals converted into RF signals (the type of signals of off-air broadcasts) are available from this connector during recording and playback. When the recorder is used separately, connect this terminal to the aerial terminal of a TV receiver for playback or monitoring.

㉖ **Direct connector section**
Connect the TU-S10EG/EK Tuner/Adapter using connectors on this section. For connection to the A/V connector(s) of a television or a second recorder, connect the provided dubbing connector to this section. See page 20.

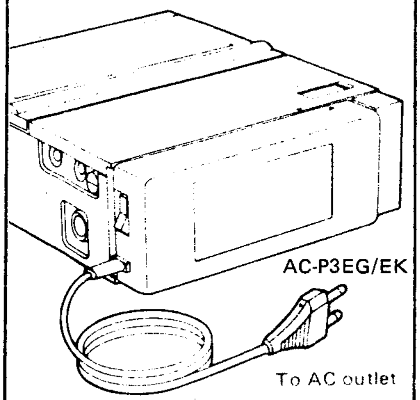
㉗ **Power unit mount**
Accepts the AC-P3EG/EK AC Power Pack, NB-P4U/NB-P3U Battery Pack or AP-P3E Car Battery Adapter.

POWER SUPPLY SYSTEM IN THE PORTABLE CONFIGURATION

The convenient 3-way power supply system gives you a choice of the most appropriate power supply unit, depending on the application.

With AC power

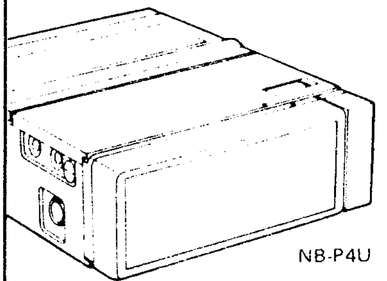
Use the optional AC-P3EG/EK AC power pack

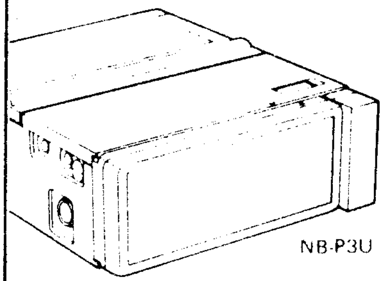

AC-P3EG/EK
To AC outlet

Where AC power is not available

Use the optional battery packs:

- NB-P4U (High-capacity)
- NB-P3U (Regular)

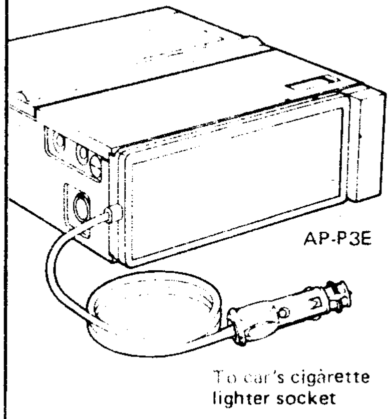


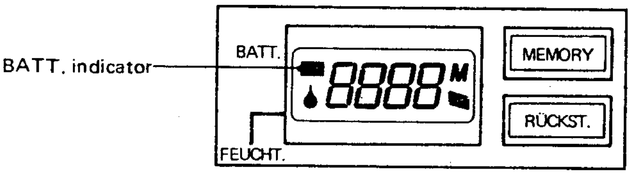


- Recharging procedure on page 11.

In a car

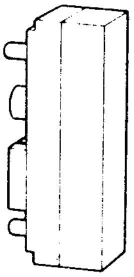
Use the optional AP-P3E car battery adapter.


AP-P3E
To car's cigarette lighter socket


BATT. indicator
BATT.
8888
M
MEMORY
RÜCKST.
FEUCHT.

Note:

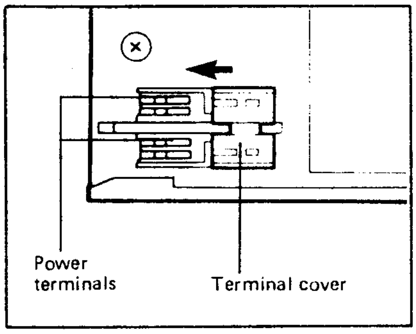
- If the BATT. indicator in the counter display should flicker during operation via the battery pack, the battery power is nearing its end. After a short time, the power is automatically switched off. Recharge the battery pack or replace it with a charged one.



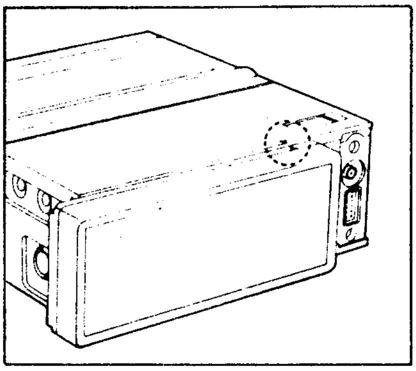
Connector cover (provided)
In outdoor applications or when just carrying the recorder about, attach the connector cover to the direct connector section to protect the connectors from dust and moisture.

ATTACHING AND REMOVING POWER SUPPLY UNITS

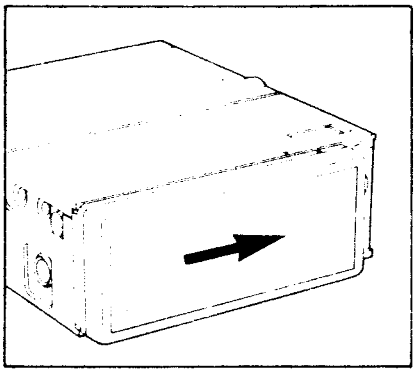
- The method of attachment and removal is identical for all power supply units.
- Be sure to switch off all power switches before attachment or removal.
- Check to see if the power terminals on the rear of the unit are covered with the terminal cover. If not, slide the terminal cover in the direction of the arrow.



To attach



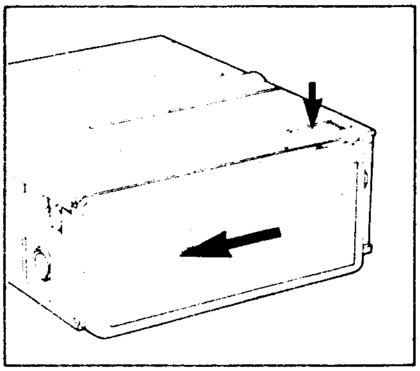
1 Align the marks.



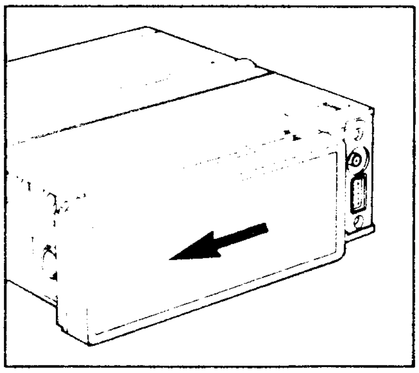
2 Slide until the unit locks in place.

Note:
Check to see if power can be switched on or off with the POWER/BETRIEB button. If not, remove the power supply unit and, after a few seconds, reattach it.

To remove



1 While pressing the BATT. button . . . .



2 . . . slide off.

POWER SUPPLY AND CONNECTION IN THE HOME-DECK CONFIGURATION

The recorder can be powered by the TU-S10EG/EK Tuner/Adapter in the home-deck configuration. To power the recorder, simply connect it to the tuner in the following manner, plug the tuner's power cord into an AC outlet and press the recorder's POWER/BETRIEB button.

To use the recorder/tuner combination to record off-air programmes and play them back, connect the tuner to the TV receiver as illustrated.

CONNECTING AND DISCONNECTING THE RECORDER FROM THE TUNER

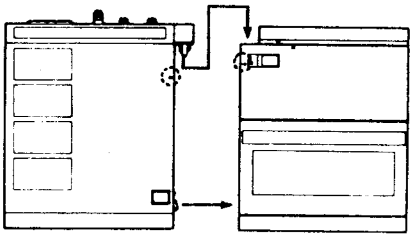
Connecting procedure

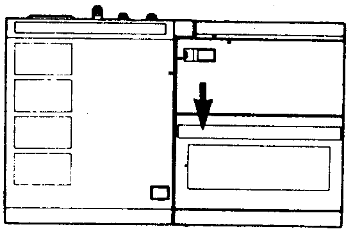
Place the recorder flush with the tuner so that the marks " ► " and " ◄ " on either unit align with each other and hook the pawls on the tuner into the slots on the recorder. Then slide the recorder rearward until a click is heard so that the recorder's connector section plugs into the tuner's connector base correctly.

Disconnecting procedure

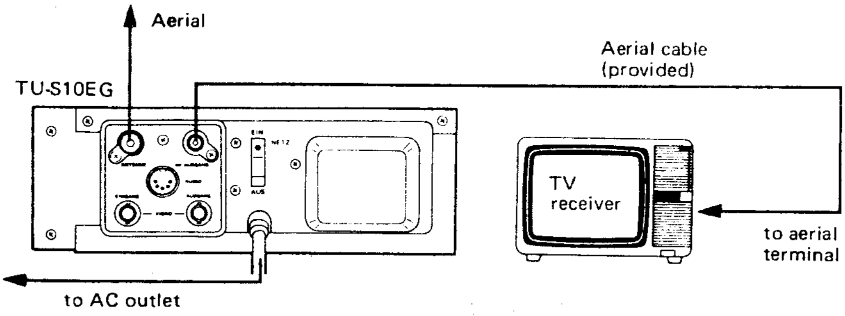
While pressing the RELEASE/FREIGABE button of the tuner, pull the recorder straight forward.

CAUTION:
- Avoid carrying the two units in the connected state.
- When connecting or disconnecting the recorder, be careful not to apply pressure to its counter display.



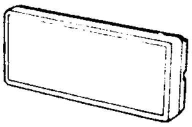


CONNECTION TO A TV RECEIVER



For more information refer to the instruction manual for the TU-S10EG.

Dummy battery (provided)



When the recorder is connected to the tuner for use as a single-piece system, install the dummy battery to occupy the indented area and give the system a balanced appearance.

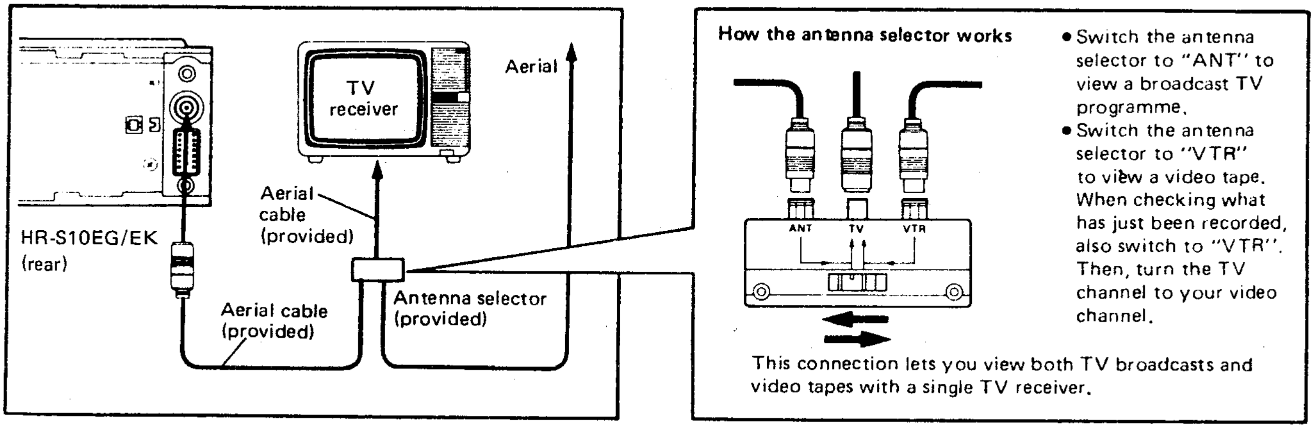
Note:
The dummy battery cannot be used as a real battery.

- In this state, the recorder can be connected or disconnected anytime at will. Before connecting or disconnecting the recorder from the tuner, make sure that the recorder's BETRIEB button is in the OFF position.

PLAYBACK CONNECTION IN THE PORTABLE CONFIGURATION

Connection to a TV receiver

The recorder can be directly connected to a TV receiver for playback.



How the antenna selector works

- Switch the antenna selector to "ANT" to view a broadcast TV programme.
- Switch the antenna selector to "VTR" to view a video tape. When checking what has just been recorded, also switch to "VTR". Then, turn the TV channel to your video channel.

This connection lets you view both TV broadcasts and video tapes with a single TV receiver.

- Remove the aerial from the TV receiver and connect the recorder via the antenna selector (provided) to the TV receiver's aerial terminal as illustrated.

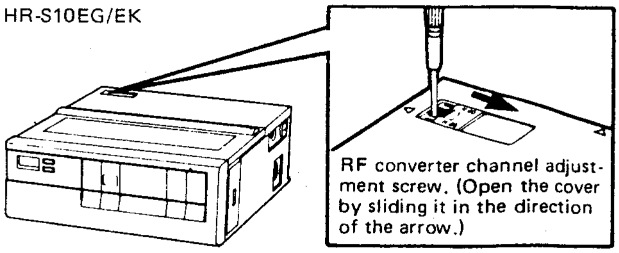
- Employ a fully-charged battery pack. For continuous playback, one fully-charged NB-P4U battery pack lasts for about 2 hours. Do not leave a video camera connected; it will consume power even if you are not using it.

VIDEO CHANNEL SETTING

The HR-S10EG/EK incorporates an RF converter for playback using a TV receiver. The output of the RF converter can be seen on the TV screen on a vacant channel which is not used for public broadcasting. The RF converter in this unit has been set to UHF channel 36 before shipment. If channel 36 is employed for broadcasting in your area, adjust the RF converter channel to one of the vacant channels between 36 and 40 as follows:

1. Adjust the TV receiver channel to one of the vacant channels.
2. Connect a video camera and switch the power on for the recorder.
3. While monitoring the camera signal on the TV screen, turn the RF converter channel adjustment screw in either direction so that the monitored picture comes in most clearly.

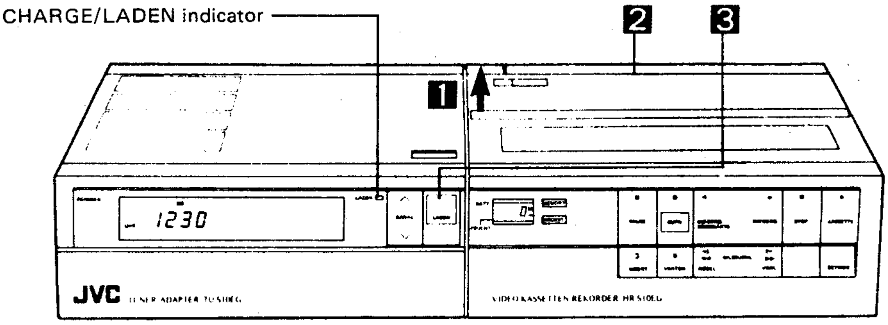
- Converter channel presetting is also possible using a pre-recorded cassette. Play back the cassette and adjust the screw to obtain the clearest picture on the TV screen.
- When you wish to view video cassette programmes, always set the TV receiver's channel selector to your VIDEO CHANNEL/VIDEOKANAL.



RF converter channel adjustment screw. (Open the cover by sliding it in the direction of the arrow.)

CHARGING THE BATTERY PACK

The tuner can recharge the battery pack attached to the recorder.

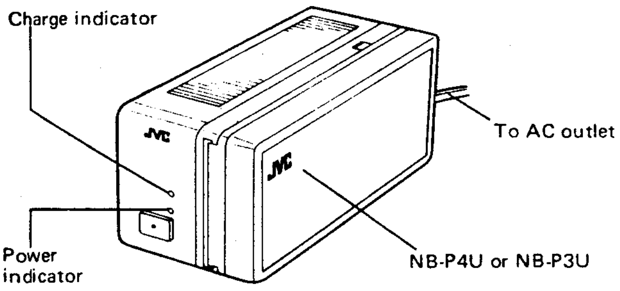


1 Connect the recorder to the TU-S10EG/EK Tuner / Adapter.
- Make sure that the power is switched off. If not press the recorder's POWER/BETRIEB button to OFF

2 Attach the battery pack to the rear of the recorder.

3 Press the CHARGE/LADEN button of the tuner.
- The CHARGE/LADEN indicator will light.
- The NB-P4U will be charged in about 120 minutes.
- The NB-P3U will be charged in about 80 minutes.
- When charging is completed, the CHARGE/LADEN indicator goes out.
- During charging, the recorder cannot be operated; pressing the POWER/BETRIEB button has no effect. If the recorder is to be used, press the tuner's CHARGE/LADEN button to stop charging (the CHARGE/LADEN indicator goes out) and then press the recorder CHARGE/BETRIEB button to ON. (The battery pack will not be fully charged.)

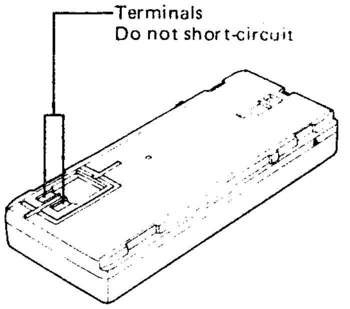
CAUTION
- Do not press the CHARGE/LADEN button when no battery pack is attached to the recorder. Even with no battery pack attached, the Charge mode will be entered and the CHARGE/LADEN indicator will light.
- Before attaching the battery pack to the recorder, make sure that the tuner's CHARGE/LADEN indicator is off. If not, press the CHARGE/LADEN button so that the indicator extinguishes.
- If the preset timer shart time is reached during charging, charging is cancelled and timer recording starts. (Therefore, a "no light" condition of the CHARGING/LADEN indicator does not necessarily mean that charging has been completed.) It is recommended that you adjust the time of charging to prevent this from happening.



BB-P3EG/EK battery charger (optional)
A more handy battery charger is optionally available so that you can take it wherever you go with the portable system. All you need is an AC outlet. Simply attach the battery pack to the charger in the same way as the battery pack is attached to the recorder. Charging time is about 90 minutes for a high-capacity battery pack and about one hour for a regular battery pack. For more details refer to the instruction manual for the BB-P3EG/EK battery charge.

A WORD ON THE EXCLUSIVE NB-P4U/NB-P3U BATTERY PACKS (optional)

The NB-P4U/NB-P3U are nickel-cadmium batteries. Give attention to the following to make the most of their characteristics.



Temperature ranges:
The recharging time is based on room temperature of 20°C. The lower the temperature, the longer the recharging time.

For charging: 10°C to 35°C
For operating: -10°C to 40°C
For storing: -10°C to 30°C

Caution
The terminals are exposed on the bottom of the battery pack. DO NOT short-circuit these terminals.

- If they are shorted, a great amount of current flows. This is not only very dangerous, but also makes the battery pack unusable.
- When transporting or storing the battery pack, exercise special care so that no metallic object touches the terminals.

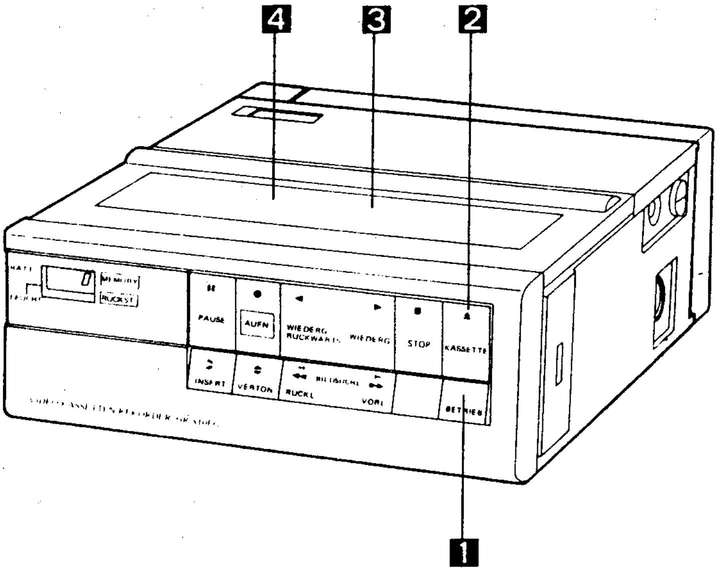
When left attached to the recorder, the battery pack discharges naturally. When not in use, make it a rule to remove the battery pack.

The battery pack has been kept in the uncharged state for shipment. Therefore, before use, charge it.

- **Avoid repeated charging.**
  Charging the battery pack repeatedly without using it may cause over-charging and shorten its service life.
- **Recharge using only a specified charger at 10°C to 35°C.**
  Especially avoid recharging in a place under 10°C, as it may cause over-charging.
- **After use, store in a discharged condition.**
- **Do not store in places of high temperatures.**
  Choose a dry place with temperatures between -10°C and 30°C for optimum storage.
- **The battery pack becomes warm immediately after being charged. This is not due to any defect.**

- Always keep the terminals clean. If they become dirty, wipe them with a piece of soft cloth.
- The fully charged NB-P4U battery pack provides power to the HR-S10EG/EK and a video camera (whose power consumption is about 6 watts) for about 60 minutes of continuous recording; the NB-P3U, for about 30 minutes.

LOADING AND UNLOADING A VIDEO CASSETTE


4
3
2
MEMORY
RÜCKST
PAUSE
AUFN
WIEDERG. RÜCKWÄRTS
WIEDERG
STOP
KASSETTE
INSERT
VERTON
BILDSUCHE
RÜCKL
VORL
BETRIEB
1

Loading

1. Press the POWER/BETRIEB button to turn power on.
2. Press the EJECT/KASSETTE button.
   - The cassette housing will lift.
3. Insert a cassette fully and correctly.
   - An inverted cassette cannot be inserted.
4. Press the cassette housing down to lock in place.
   - Be careful not to press the cassette housing with a cassette inserted midway.

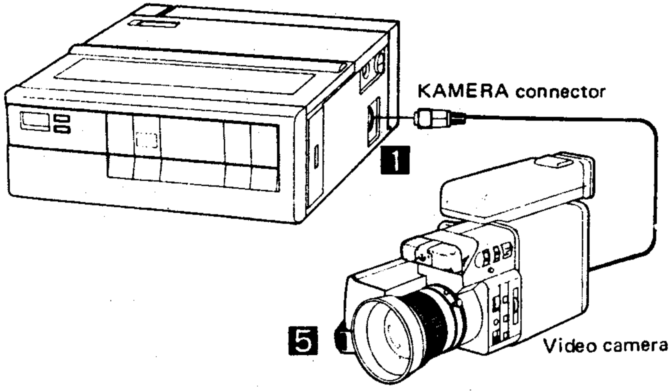
Unloading

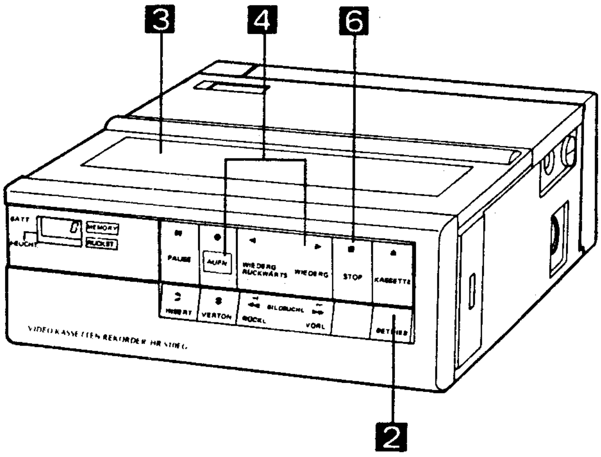
1. Press the POWER/BETRIEB button to turn power on.
2. Press the EJECT/KASSETTE button.
3. Remove the cassette.
4. Press the cassette housing down until it locks.

Notes:

- Do not load and unload the cassette successively without allowing the tape to run at all. This would slacken the tape and thereby damage it.
- VHS video cassettes are equipped with a safety tab to prevent accidental erasure. When the tab is removed, recording cannot be performed. If you wish to record on a cassette whose tab has been removed, use cellophane tape to block the slot. Refer to pages 28 and 29 for more information regarding the video cassette.

RECORDING WITH A VIDEO CAMERA





CAUTION:
Use a video camera whose power consumption does not exceed 10 watts.

1 Connect a video camera.
For powering the recorder, refer to pages 7, 8 and 9.

2 Press POWER/BETRIEB. (The JVC GZ-S5E or GZ-S3E camera can control power on/off of the recorder.)

- The recorder will start consuming power.
- This also will start supplying power to the camera. If a monitor or TV receiver is connected to the recorder or if the electronic viewfinder is used, the picture can be monitored on their screen.

3 Load a cassette.

4 Press REC/AUFN. and PLAY/WIEDERG. simultaneously.

- The recorder enters the Recording Standby mode. Starting or stopping of the tape is remote-controlled by the camera's start/stop switch; pressing the REC/AUFN. and PLAY/WIEDERG. buttons will not start the tape running.

5 Operate the camera's start/stop switch. (During recording, the REC/AUFN. indicator flashes.)

- Now recording will start.
- To stop recording temporarily, operate the start/stop switch to enter the Recording Standby mode.

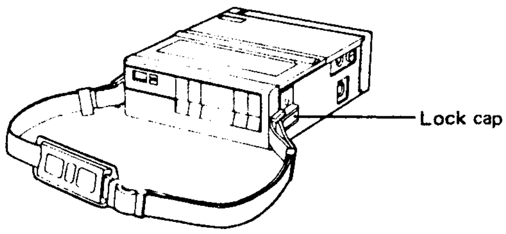
6 To end recording, press STOP.

Notes:

- For camera operation refer to the instruction manual for the relevant camera.
- If you remain in the Recording Standby mode for longer than about 5 minutes with the power on, the power is automatically switched off to protect the tape.
- If the battery power becomes insufficient during battery operation, the BATT. indicator flickers and then the recorder is automatically switched off. In this case, recharge the battery or replace it with a charged one.
- When a microphone is connected to the recorder's microphone jack, sound from the camera's built-in microphone cannot be recorded.

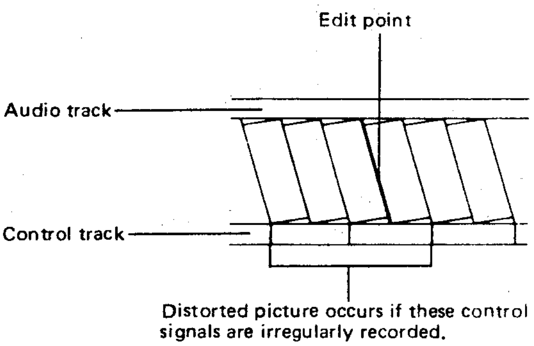
Attaching the shoulder strap

- Align the connector latches on each end of the strap with the slots of the recorder's strap retainers.
- Press in to firmly attach each strap connector.
- To remove the shoulder strap, first open the lock caps of each connector, then slide the connector latches out of the retainers.



CONVENIENT FACILITIES IN CAMERA RECORDING

Automatic editing function


Edit point
Audio track
Control track
Distorted picture occurs if these control signals are irregularly recorded.

The HR-S10EG/EK employs an automatic backspace editing mechanism to produce clean assembled recordings. When the tape is stopped in the Pause mode during recording, it is rewound (backspaced) automatically for about 1 second of programme time. When the Pause mode is released for recording, the backspaced section is played back while the control signals are being read and recording starts automatically when the previous and subsequent recordings are synchronized. As long as the starting and stopping of the tape is controlled by the camera's start/stop switch, clean edits can be obtained.

Recording pause mode lock facility

If you wish to stop recording longer than about 5 minutes to prepare for the next shot, turn the power off in the Record Pause mode so that the Stop mode will not be entered automatically and thereby the automatic editing function will not be cancelled.

The special recording pause mode lock facility keeps the tape loaded around the tape transport mechanism while power is off. When power is reapplied, recording will start directly from the Pause mode, allowing the automatic editing mechanism to function as it should.

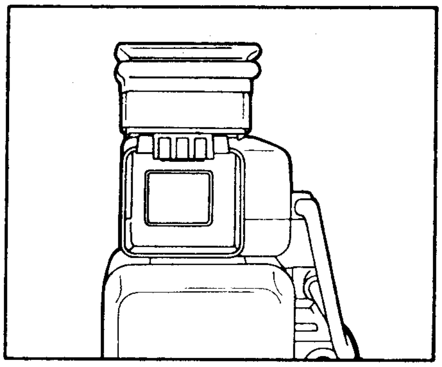
Note: Allow for about 10 seconds (warm-up time of the camera) before you start actual shooting after being in the Record Pause mode with power off.

Automatic quick review function

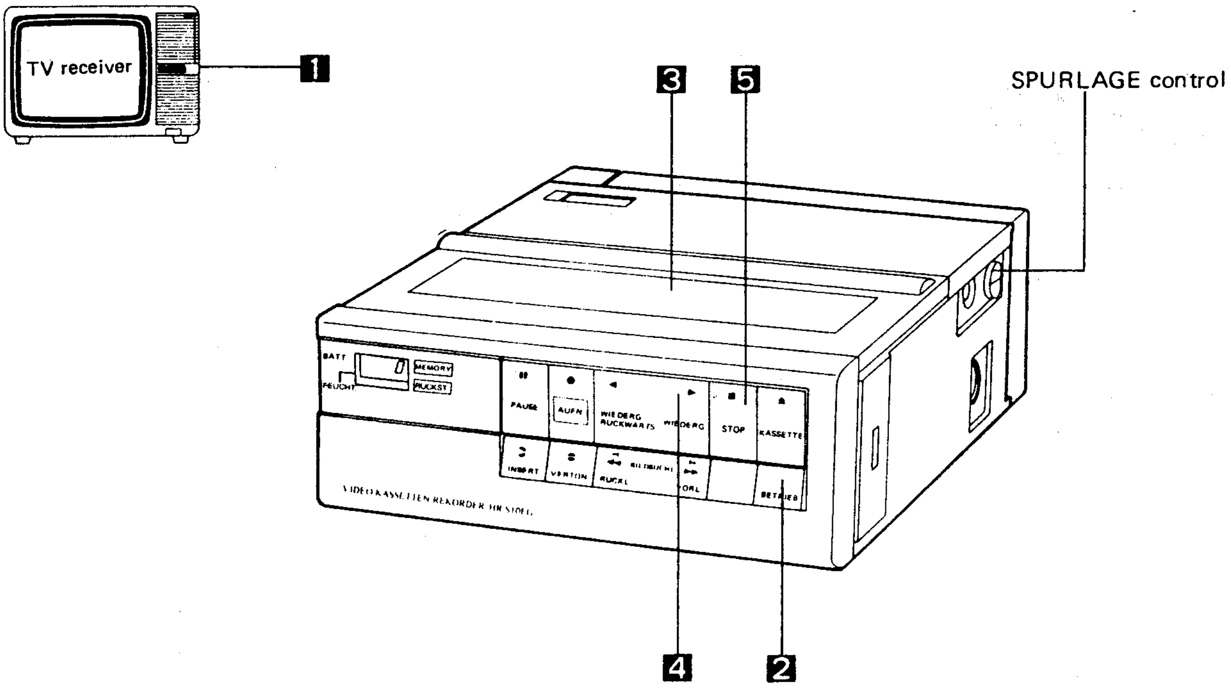
Each time you stop the tape in the Pause mode, the tape is automatically back-spaced for assemble editing, as fully described above. The automatic quick review function enables the reverse playback picture to be viewed during this backspacing period of about 1 second on the camera's viewfinder screen. Therefore, when you stop the tape with the camera's start/stop switch, you can always check the last second of your recording automatically.

Monitoring the playback on the camera's viewfinder

If a video camera equipped with an electronic viewfinder is used, the recorded material can be checked on the spot. For this purpose, first rewind the tape and press the WIEDERG. button. The playback picture will be seen on the camera's viewfinder.



PLAYING BACK A VIDEO CASSETTE


TV receiver
1
3
5
SPURLAGE control
BATT
FEUCHT
MEMORY
RÜCKST
PAUSE
AUFN
WIEDERG RÜCKWÄRTS
WIEDERG
STOP
KASSETTE
INSERT
VERTON
RÜCKL
VORL
BETRIEB
4
2

1 Switch on the TV receiver.
Adjust the TV receiver's channel to your video channel.
(For connection to a TV receiver, refer to page 10.)

2 Press POWER/BETRIEB to ON.

3 Load a pre-recorded cassette.

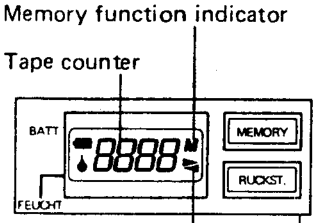
4 Press PLAY/WIEDERG.

5 Press STOP at the end of the programme.

Note:

- Noise bars may appear on the screen if you play back a tape which was recorded using another recorder. In such cases, adjust the TRACKING/SPURLAGE control. Turn it in either direction to adjust the picture. After playing a particular tape, return the control knob to the centre position.

MORE TAPE HANDLING FACILITIES



Tape direction indicator

► : forward

◄ : reverse

MEMORY button

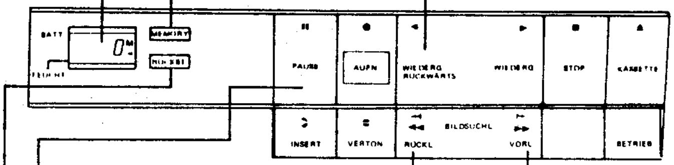
- Press to engage the memory function. "M" will appear in the upper right corner of the display. The tape will stop automatically in the Rewind and Fast Forward modes near the counter reading of "0".
- To cancel the memory function, press the MEMORY button.

REVERSE/WIEDERG. PLAY/ RÜCKWÄRTS button

- To view the tape in the reverse direction, press this button in the Stop mode.
- Noise bars may appear in reverse playback. This is not due to any defect of the unit.
- No audio is heard in reverse playback.

Note:

- When the counter memory function is not needed, make "M" disappear by pressing the MEMORY button.



RESET/RÜCKST. button

Press to reset the tape counter to "0".

PAUSE button

- To view a still picture, press this button in the Play mode. To resume normal playback, press the PLAY/WIEDERG. button.
- The still picture can be advanced each time this button is pressed. Holding this button pressed continuously advances the picture.
- Noise bars may appear or the picture may be unstable. This is not due to any defect of the unit.
- No audio is heard.
- Pressing the PAUSE button in the Reverse Play mode does not engage the Still mode. To view a still picture from this mode, first press the PLAY/WIEDERG. button and then the PAUSE button.

FF/VORL./SEARCH/BILDSUCHL. button

- To fast forward the tape, press this button in the Stop mode.
- To search the tape in the forward direction, hold this button pressed in the Play mode.
- The search speed is about 9 times normal.
- No audio is heard.

REW./RÜCKL./SEARCH/BILDSUCHL. button

- To rewind the tape, press this button in the Stop mode.
- To search the tape in the reverse direction, hold this button pressed in the Play mode.
- The search speed is about 9 times normal.
- No audio is heard.

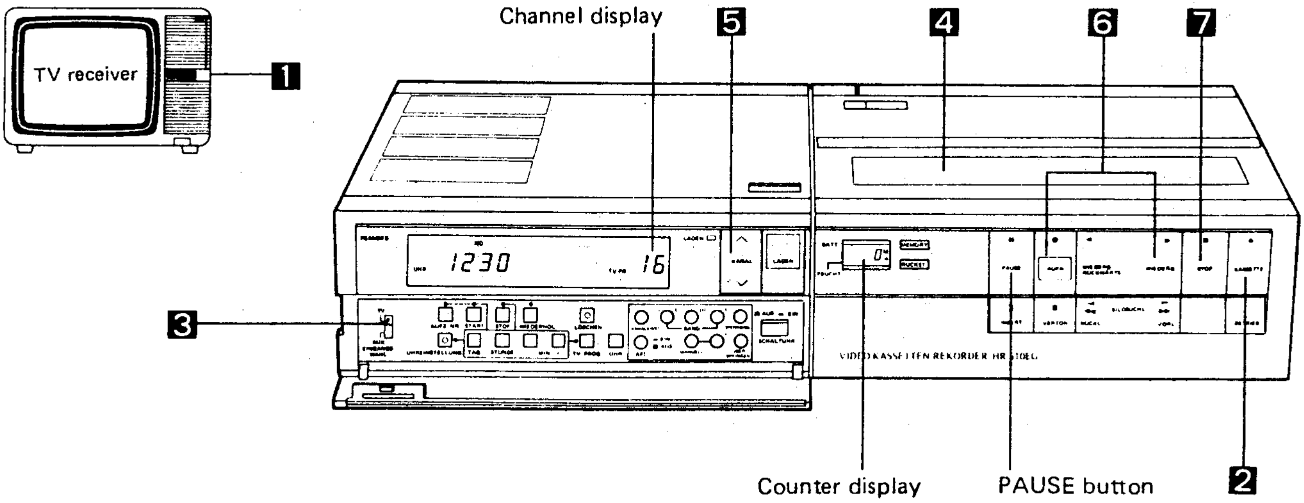
Notes:

- When the Still mode continues for longer than about 5 minutes, the Stop mode will be entered automatically.
- In the special-effects playback modes, the picture may become unstable from time to time.

RECORDING TV PROGRAMMES USING THE TU-S10EG TUNER/ADAPTER

Basic concept: receive the desired TV programme with the tuner and operate the recorder for recording.

CAUTION:
When recording TV programmes, do not leave a camera or a microphone connected to the recorder.



1. Switch on the TV receiver.
   - Adjust the TV receiver's channel to your video channel.
2. Press POWER/BETRIESB.
3. Set INPUT SELECT/EINGANGS-WAHL to TV.
4. Load a cassette.
5. Select the channel you wish to record.
6. Press REC/AUFN. and PLAY/WIEDERG. simultaneously to start recording.
7. Press STOP at the end of the programme.

Notes:

- If the REC/AUFN. button cannot be engaged, check to see if the cassette safety tab has been removed. (See page 2.)
- If there is part of the programme you don't want to record, press the PAUSE button. To cancel the Pause mode, press PLAY/WIEDERG. button.
- The Pause mode is released automatically after about 5 minutes in order to prevent tape damage and the Stop mode is engaged.
- The tuner's automatic channel lock mechanism prevents the selected channel from being altered during recording. Therefore, if you wish to change the channel during recording, first engage the Pause mode and then select a different channel.

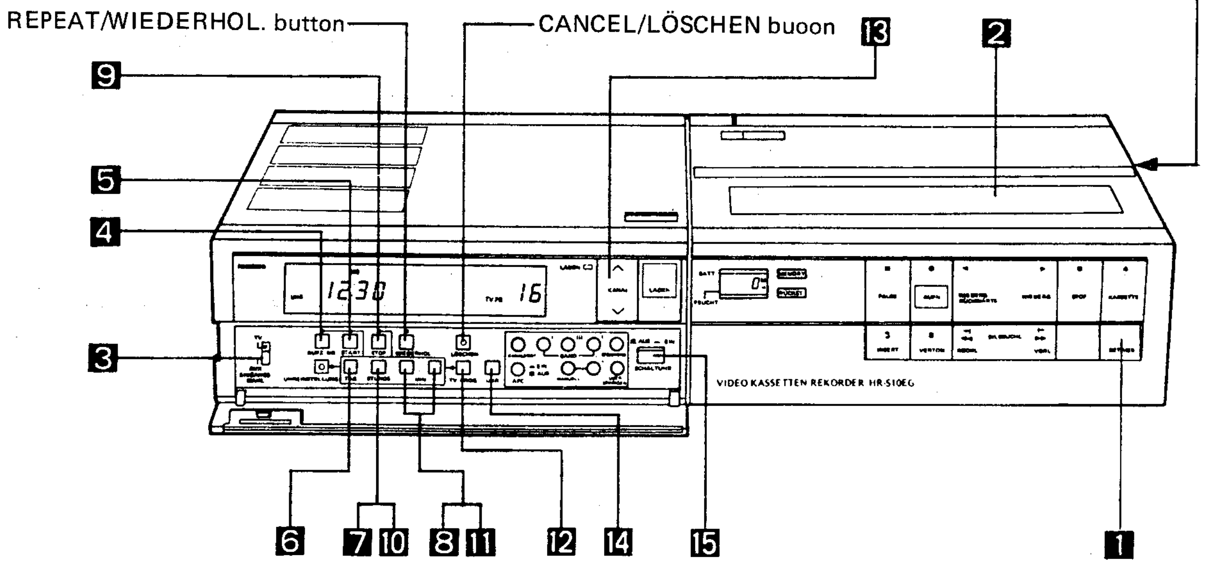
Recording one TV programme while watching another
The recording procedures are exactly the same as above. The points to be remembered are:

- Select the channel you wish to record with the tuner's channel selector.
- Select the channel you wish to view with the TV receiver's channel selector.

AUTOMATIC TIMER RECORDING USING THE TU-S10EG TUNER/ADAPTER

The tuner's 14-day/8-event programmable timer permits recording of preset channels on preset days, at preset times for preset lengths while you are away.

Do not leave a microphone or a camera connected.



1 Press POWER/BETRIEB.

2 Load a cassette.

3 Set INPUT SELECT/EINGANGS-WAHL to TV.

4 Press PROGRAM/AUFZ. NR.

- The display will change to the Timer Set mode. You are ready to enter the data into No. 1 programme memory. If you want to change the programme number, press the PROGRAM/AUFZ. NR button a required number of times.

1
SO
START
STOP
PROG

5 Press START for day and switch-on time setting.

- The START indicator will flash.

6 Press PLAY/TAG to obtain desired "day" indication.

7 Press HOUR/STUNDE to obtain desired "hour" indication.

8 Press MIN+ or MIN– to obtain desired "minute" indication.

9 Press STOP for switch-off time setting.

- The STOP indicator will flash.

10 Press HOUR/STUNDE to obtain desired "hour" indication.

11 Press MIN+ or MIN– to obtain desired "minute" indication.

12 Press CHANNEL/TV. PROG. for setting the channel from which you want to record.

- The PROG. indicator will flash.

13 Press CHANNEL/KANAL "∧" or "∨" to obtain desired channel indication.

14 Press CLOCK/UHR to change the display to the Clock mode.

- If no command is entered within about 60 seconds, all displays will be restored automatically.

15 Press TIMER/SCHALTUHR to ON/EIN.

- The TIMER/SCHALTUHR indicator will light together with the numbers of the programmed memories.

For more information on the programmable timer refer to the instruction manual for the TU-S10EG/EK.

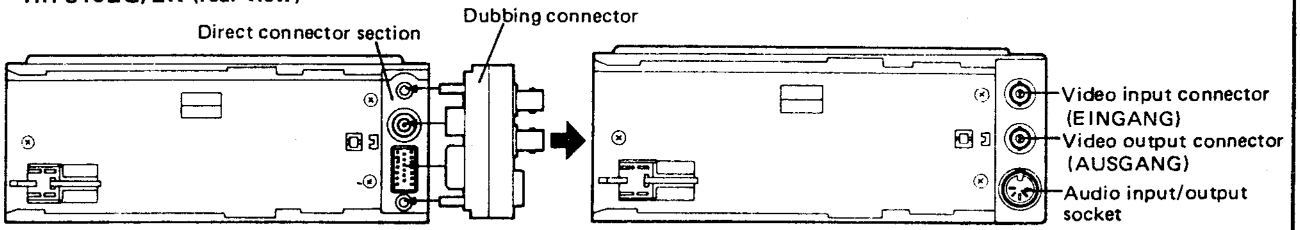
DUBBING CONNECTOR
(TAPE-TO-TAPE EDITING AND A/V CONNECTION TO A TELEVISION)

A dubbing connector is provided with the recorder to enable it to be connected to another video recorder for editing, or to a television equipped with A/V input connectors, without using the Tuner/Adapter.

- When the tuner is used in combination with the recorder, this dubbing connector is not needed. For editing operations using the tuner, refer to the instruction manual for the TU-S10EG/EK.

Installing the dubbing connector to the recorder

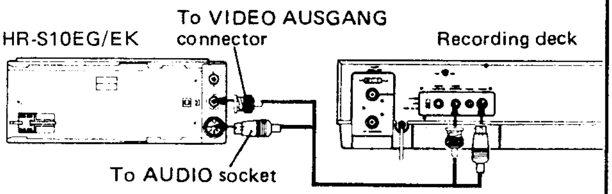
HR-S10EG/EK (rear view)


Direct connector section
Dubbing connector
Video input connector (EINGANG)
Video output connector (AUSGANG)
Audio input/output socket

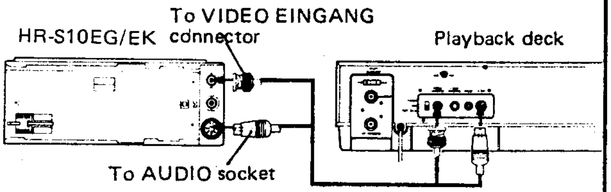
Insert plugs correctly.

Connection for editing

- **Using the HR-S10EG/EK as a playback deck**
  Use one of power supply units (see page 7).


HR-S10EG/EK
To VIDEO AUSGANG connector
Recording deck
To AUDIO socket

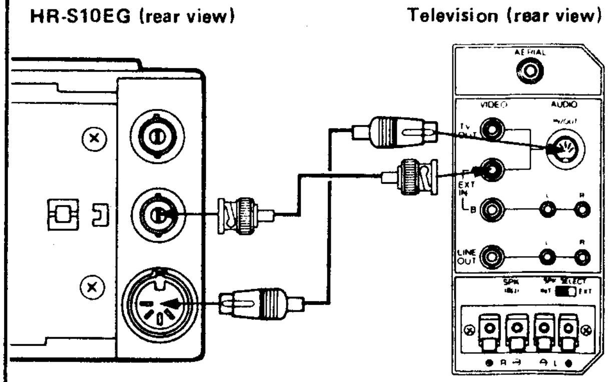
- **Using the HR-S10EG/EK as a recording deck.**
- **Use one of power supply units (See page 7).**


HR-S10EG/EK
To VIDEO EINGANG connector
Playback deck
To AUDIO socket

Caution
- **Copyrighted material must not be copied.**
- Tape-to-tape editing may cause slight deterioration of picture quality.
- If you connect a video camera to the side panel CAMERA/KAMERA connector during tape-to-tape editing, the camera signal will be automatically recorded.

Connection to a television via A/V connectors

This connection permits direct playback with a television equipped with A/V input connectors. As a power source, use the AC-P3EG/EK, NB-P4U, NB-P3U or AP-P3E.


HR-S10EG (rear view)
Television (rear view)
AERIAL
VIDEO
AUDIO
EXT IN
LINE OUT

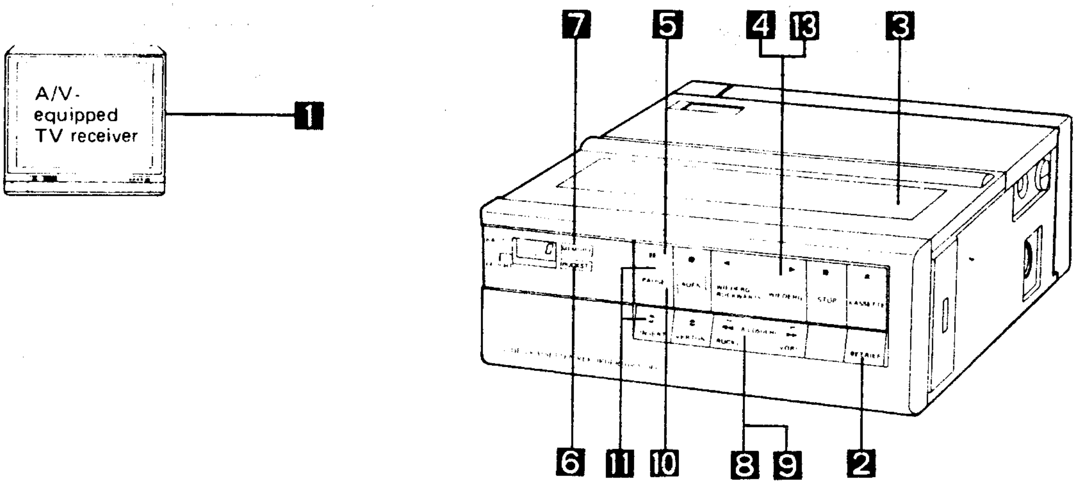
INSERT EDITING

Insert editing means recording a new scene into a section of pre-recorded tape so that a part of the original recording can be replaced with a new sequence without excessive picture distortion at edit-in and edit-out points. New video and audio signals to be inserted can come either from a video camera or another video cassette recorder, or from the tuner. Refer to page 4 for information on the priority of video and audio input signals.

Connections

To insert video and audio signals from a camera, connect a camera to the recorder's CAMERA/KAMERA connector. See illustration on page 14.
To insert video and audio signals from another video recorder, connect a second video recorder to the HR-S10EG/EK via the dubbing connector as illustrated on page 20.

Note:
- In the configuration using the dubbing connector, start editing after the playback picture from the second recorder reaches its "clean" condition.



1 Switch on the TV receiver.
- Engage the TV receiver in the VIDEO mode by pressing its TV/VIDEO button.

2 Press POWER/BETRIEB.

3 Load a pre-recorded cassette.

4 Play back the tape to determine the edit-out point (the end of the tape section to be replaced).

5 Press PAUSE at the edit-out point.

6 Press RESET/RÜCKST.
- The tape counter will be reset to "0".

7 Press the MEMORY button to obtain "M" in the display.

8 Hold REW/SHOTTLE SEARCH (RÜCKL./BILD-SUCHL.) pressed to determine the edit-in point (the beginning of the tape section to be replaced).

9 Release REW/SHUTTLE SEARCH (RÜCKL./BILD-SUCHL.) at a point slightly past the desired edit-in point; normal playback will start.

10 Press PAUSE at the edit-in point.

11 Press PAUSE while holding INSERT pressed.
- This engages the Insert Standby mode in which the input signal can be monitored on the TV screen; the still picture changes into the input signal that you are going to record.
- The input sound signal can also be monitored.

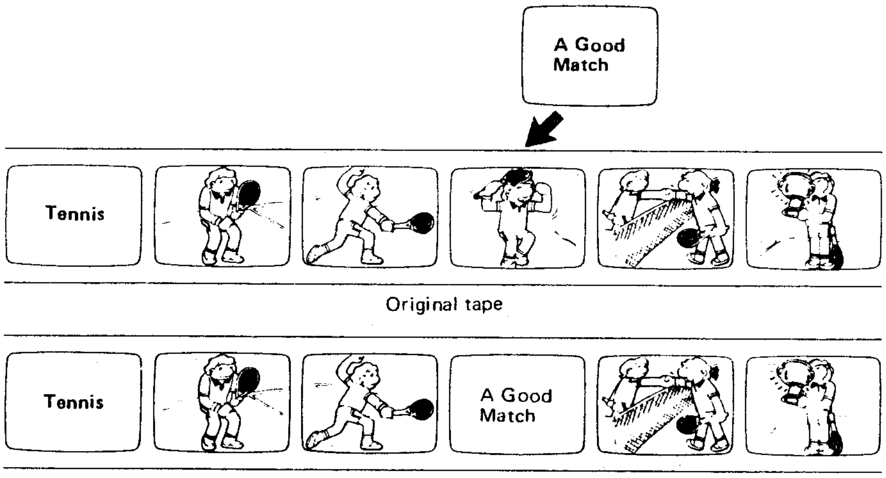
12 Operate the source equipment properly.
- Play back on another recorder the tape programme to be inserted.
- Operate the camera so that it is in the locked running mode.

13 Press PLAY/WIEDERG. Insert editing will start.

14 At the counter reading of "0", insert editing will stop automatically and the Play mode will be engaged. The INSERT indicator will go out.

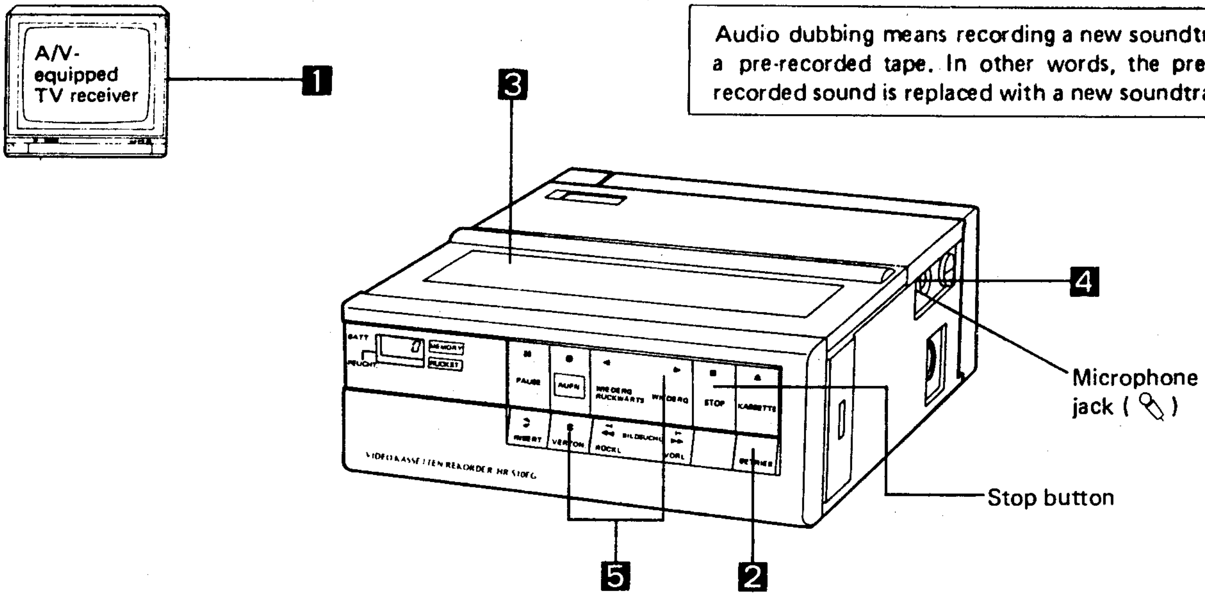
Notes:
- Do not use the STOP button to stop insert editing. If you press the STOP button, the tape stops and the Insert Edit mode is cancelled.
- The insert editing mechanism used in the HR-S10EG/EK has been developed for home use applications. It may happen that pictures slightly distort or colours are incorrect at the edit points. This is not due to any defect of the unit.
- If there is a non-recorded section on the tape, the Insert Edit mode will be cancelled automatically in that section (INSERT indicator will go out) and the Play mode will be engaged.
- Insert editing is not possible with non-recorded cassettes or cassettes whose safety tab has been removed.

Note:
- Insert editing is also possible with the recorder/tuner combination. For details refer to the instruction manual for the TU-S10EG/EK.



AUDIO DUBBING

Audio dubbing means recording a new soundtrack on a pre-recorded tape. In other words, the previously recorded sound is replaced with a new soundtrack.



1 Switch on the TV receiver.
- Engage the TV receiver in the VIDEO mode by pressing its TV/VIDEO button. For connection to a TV receiver, refer to page 46.

2 Press POWER/BETRIEB.

3 Load a pre-recorded cassette.

4 Connect a microphone to the recorder's microphone jack (🎤).
- To record sound from a separate audio source, connect its line out connector to the dubbing connector's AUDIO connector (refer to page 20). Do not leave the microphone connected to the recorder in this case.

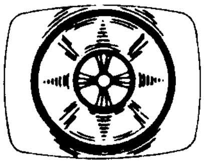
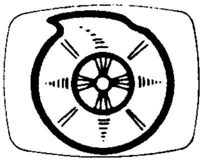
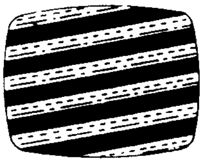
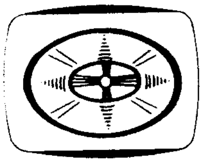
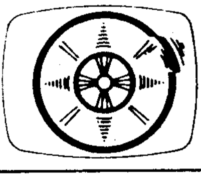
5 Press WIEDERG. while holding VERTON. pressed.
- The VERTON. and WIEDERG. indicators will light and audio dubbing will start.
- To stop audio dubbing, press the STOP button.

Note:
- Audio dubbing is also possible with the recorder/tuner combination However, the TV sound from the tuner cannot be recorded in audio dubbing even when the EINGANGS-WAHL switch is set to TV. For details refer to the instruction manual for the TU-S10EG/EK.

Notes:
- Audio dubbing is not possible onto a cassette whose safety tab has been removed. See page 2.
- Use a high-impedance microphone.
- If whistling or howling is heard during audio dubbing, reduce the TV volume or move the microphone farther away from the TV. Recording is being performed even if sound is not heard from the TV receiver. If you want to monitor the sound being recorded, connect an earphone to the earphone jack (🎧).
- The pause function facilitates audio dubbing. First play back the pre-recorded tape and press the PAUSE button at the point from which you wish to start audio dubbing. If necessary, adjust the point accurately by pressing the PAUSE button a few more times. Then press WIEDERG. while holding VERTON. pressed. This permits you to start audio dubbing exactly at the right point.

ADJUST YOUR TV RECEIVER WHEN . . .

If your TV receiver shows the following symtoms when the PAUSE button is pressed during playback, adjust the TV receiver first.

Symptom	Adjustment
Picture vibrates vertically. 	Turn the V-Hold knob slightly for stabilizing.
The upper portion of the picture drifts horizontally. 	Turn the H-Hold knob slightly for stabilizing.*
Picture rolls. 	Turn the H-Hold knob slightly for stabilizing.
Picture is flattened vertically. 	Inherent in your TV receiver.
Only a portion of the picture continues to flicker. 	Not adjustable. Inherent in your TV receiver.

HEAD CLEANING

- Picture playback may become blurred or interrupted while the TV programme received is clear. This does not mean that the recorded programme has been erased.
- Dirt accumulated on the video heads after long periods of use causes such troubles. In this case, head cleaning requiring highly technical care is necessary.

If the V-Hold and H-Hold knobs are not provided on your TV receiver, please consult you TV dealer.

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*If an unsatisfactory result is obtained, it is necessary to adjust the AFC circuit of the TV receiver.

IN CASE OF DIFFICULTY

What may initially appear to be trouble is not always a real problem. Make sure first . . . .

Symptoms	Check points
No power is applied to the recorder with a power supply unit attached.	● Is a power supply unit (battery pack, AC power pack or car battery adapter) correctly attached? – Remove it once and reattach after a few seconds. ● Is the battery pack charged?
No power is applied to the recorder/tuner combination.	● Is the power cord disconnected? – Connect it. – If it fails, reconnect it after a few seconds. ● Is the rear panel MAIN POWER/NETZ switch of the tuner set to ON/EIN? ● Is the tuner's TIMER/SCHALTUR button pressed to ON/EIN? – Press it to OFF/AUS. ● Is the recorder correctly connected to the tuner? ● Is the recorder's POWER/BETRIEB button in the ON position? ● Is the tuner's CHARGE/LADEN indicator lit? – Press the tuner's CHARGE/LADEN button to turn the indicator off.
Playback picture does not appear while the tape is running.	● Is the TV receiver's channel selector set to the correct video channel? – Set to the RF converter channel. (See page 10.)
AUFN., VERTON. or INSERT button cannot be engaged.	● Is the safety tab on the video cassette broken? – Reseal the slot with cellophane tape.
Tape stops in the Rewind or Fast Forward mode.	● Is the MEMORY button set to ON? – Press the MEMORY button to cancel the "M" mark in the display.
Noisy playback picture.	● Adjust with the TRACKING/SPURLAGE control. Return the control to its centre position after playing back the particular tape.
Noise such as whistling or howling is heard from TV while camera recording or audio dubbing.	● Move camera or microphone away from TV or reduce TV sound volume.
Playback sound is different from that recorded.	● Is a microphone plugged in? – Unplug it.
Timer recording impossible.	● Is the clock time correct or the timer correctly set? – Check. ● Have you pressed the tuner's TIMER/SCHALTUR button to ON/EIN? ● Is the PLAY/WIEDERG. indicator lit? – The loaded cassette may be without it safety tab. Press the TIMER/SCHALTUR button OFF/AUS and, after powering the recorder, replace the cassette with a recodable one.
Camera recording impossible.	● Is the camera correctly connected to the recorder?
Playback, reverse playback, rewind or fast forward impossible.	● Is the tape already wound to one end or the other? – Check the tape inside the cassette.

SPECIFICATIONS

Format : VHS PAL standard
Recording system : Rotary, slant azimuth two-head helical scan system
Video signal system : PAL-type colour and CCIR monochrome signals
Tape width : 12.65 mm
Tape speed : 23.39 mm/sec.
Maximum recording time : 240 min. with JVC E-240 video cassette
Temperature
  Operating : 0°C to 40°C
  Storage : -20°C to 60°C
RF output signal : UHF channels 36 – 40 (adjustable, preset to UHF channel 36 when shipped)
Power consumption : 6 W (16 W with camera)
Power requirement : 12 V ⎓
Camera connector output : 12 V ⎓ , 10 W maximum

Video
  Input : 0.5 to 2.0 Vp-p, 75 ohms, unbalanced (using the provided dubbing connector)
  Output : 1.0 Vp-p, 75 ohms, unbalanced (using the provided dubbing connector)
  Signal-to-noise ratio : 43 dB (Rohde & Schwarz noise meter)
  Horizontal resolution : More than 250 lines

Audio
  Input : Microphone: -67 dBs, 10 k-ohms, unbalanced
    Line: -20 dBs, 50 k-ohms, unbalanced (using the provided dubbing connector)
  Output : Earphone: Mini-jack
    Line: -6 dBs, 1 k-ohm, unbalanced (using the provided dubbing connector)
  Signal-to-noise ratio : More than 40 dB
  Frequency range : 70 Hz to 10,000 Hz
Dimensions : 204(W) x 80(H) x 225(D) mm
Weight : 2.4 kg

Provided accessories
  Aerial cable x 2
  Shoulder strap
  Antenna selector
  Dubbing connector
  Connector cover
  Dummy battery
  Video cassette

Optional accessories
  TU-S10EG/EK Tuner/adapter
  NB-P4U High-capacity battery pack (1.2 AH)
  NB-P3U Regular battery pack (0.75 AH)
  BB-P3EG/EK Battery charger
  AC-P3EG/EK AC power pack
  AP-P3E Car battery adapter
  CB-P10U System carrying case
  CB-P11U Carrying bag (for outdoor shooting)
  Video cassette

Design and specifications subject to change without notice.

SECTION 1
GENERAL DESCRIPTION

1.1 GENERAL OUTLINE

The VHS system achieves very low tape consumption and uses low cost video cassette tape. Recording time in the standard mode has become 3 hours.

Increased recording time results from the narrow gap video heads, high sensitivity video tape and the slant azimuth recording head configuration which eliminates the need for a guard band between recorded tracks.

In addition, the VHS format takes into consideration special operating modes such as still picture, slow motion and speed playback.

Adoption of the VHS format presented several technical challenges. Foremost among these were obtaining high picture quality and high resolution despite the slow (4.9 meters per second) relative speed between the tape and video heads, improving signal to noise ratio (S/N), and preventing black to white reversal phenomena due to the short recording wavelength of 1.0 μm. Also the $\pm 6^\circ$ azimuth angle of the video heads alone is not sufficient to eliminate crosstalk from the lowband converted color signal.

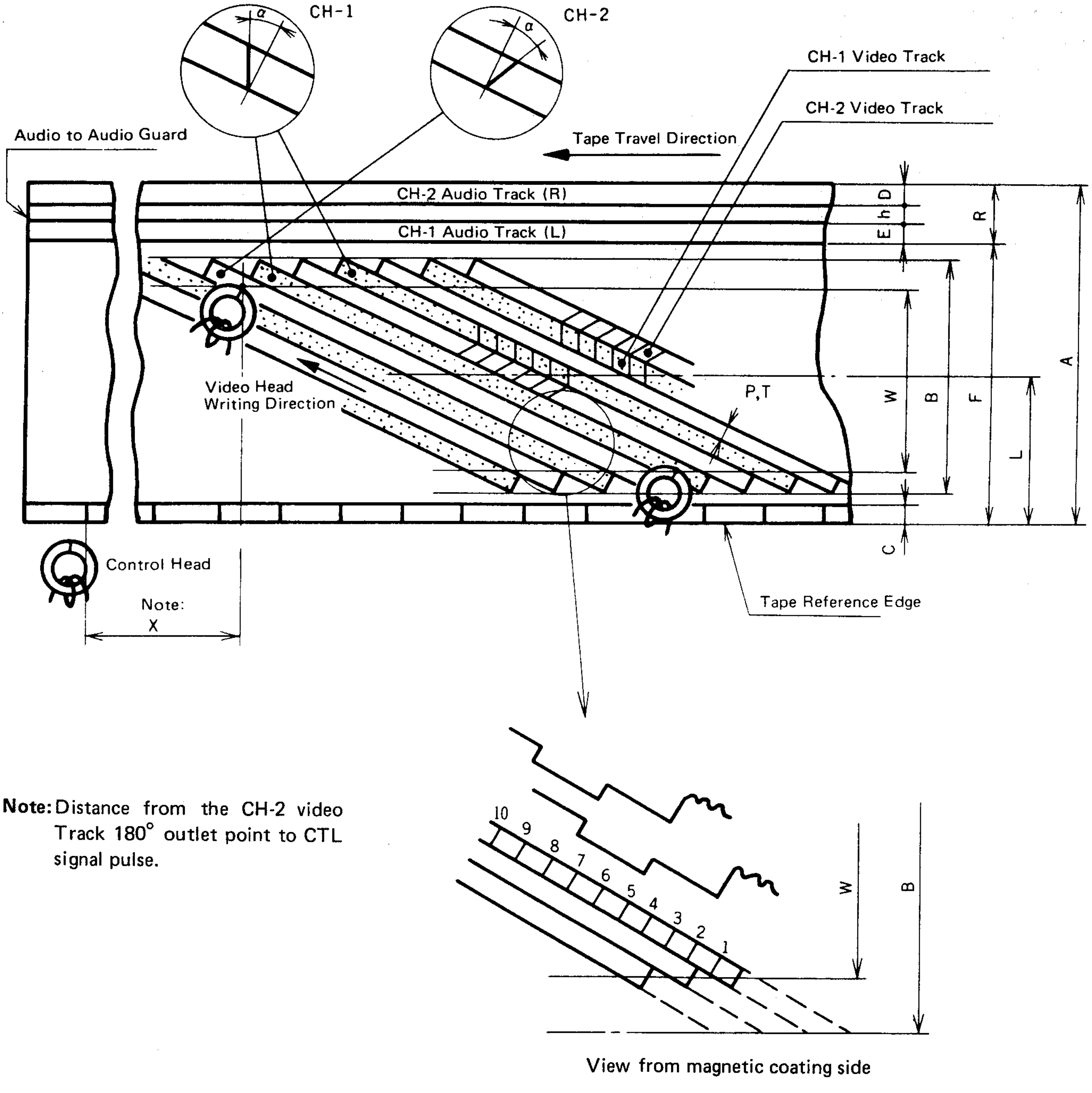
Steps for solving these difficulties included adoption of a nonlinear emphasis circuit and selecting the emphasis amount for optimum S/N. The reversal problem was overcome by using a double limiter circuit, while a phase shift system has been designed for eliminating color crosstalk.

The following discussion covers several main points of the VHS format.

1.2 MAGNETIC TAPE PATTERN

1.2.1 Standard

In the VHS format, two rotating video heads at ±6° azimuth angle are used for recording without a guard band. Fig. 1-1 indicates the recording pattern, while the pertinent values are listed in Table 1-1.



CH-1
CH-2
α
CH-1 Video Track
CH-2 Video Track
Audio to Audio Guard
Tape Travel Direction
CH-2 Audio Track (R)
CH-1 Audio Track (L)
D
h
E
R
A
W
B
F
L
P,T
C
Video Head
Writing Direction
Control Head
Note:
X
Tape Reference Edge
10
9
8
7
6
5
4
3
2
1
W
B
View from magnetic coating side

Note: Distance from the CH-2 video Track 180° outlet point to CTL signal pulse.

Fig. 1-1 Magnetic tape pattern

Items		Standard	Remarks
1. (A) Tape Width	mm	12.65 ± 0.01	
2. (Vt) Tape Speed	mm/sec	23.39 ± 0.5%	
3. (ϕ) Drum Diameter	mm	62 ± 0.01	(Upper Drum)
4. (Vh) Writing Speed	m/sec	4.85	
5. (P) Video Track Pitch	mm	0.049	
6. (B) Video Width	mm	10.60	
7. (W) Video Effective Width	mm	10.07	
8. (L) Video Track Center	mm	6.2	Measured from reference edge
9. (V) Video Track Width	mm	0.049	
10. (C) Control Track Width	mm	0.75	
11. (R) Audio Track Width	mm	1.0	Single track
12. (D) Audio Track Width	mm	0.35	CH-2 (R)
13. (E) Audio Track Width	mm	0.35	CH-1 (L)
14. (F) Audio Track Reference Line	mm	11.65	Measured from reference edge
15. (h) Audio to Audio Guard Width	mm	0.3	
16. (θ_o) Video Track Angle		5°56′ 7.4″	(Stopped)
17. (θ) Video Track Angle		5°57′ 50.3″	(Running)
18. (α) Video Head Gap Azimuth Angle		6° ± 10′	
19. (X) Positions of Audio and Control Head	mm	79.244	
20. ( ) Positions of Front Edge of V-SYNC		5 ~ 8H	Inside the W bottom edge
21. ( ) Tape Back-Tension		30 ~ 45 g	At tape beginning and at the drum entrance

Table 1-1 Magnetic tape pattern

Note: Tests and measurements shall be made under the following conditions.
Temperature: 20°C ± 2°C, Relative humidity: 65% ± 5%

1.2.2 Horizontal Correlation

The azimuth head configuration removes crosstalk from most of the high frequency portion of the FM luminance signal, however, it is not able to fully eliminate crosstalk from the low frequency component of the lower sideband portion. This residual crosstalk is reduced by employing line correlation for the tape pattern.

Line correlation (or "H correlation") consists of arranging the horizontal sync signal positions of adjacent recorded tracks. Since this makes the frequencies of the main signal and crosstalk signal very close, the demodulated crosstalk amount becomes extremely low with respect to the main signal. The type of H correlation used in the VHS format is shown in Fig. 1-2.

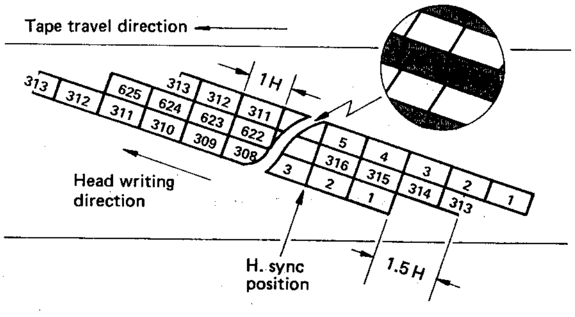


Fig. 1-2 VHS recording signal pattern

In order to provide H correlation in the tape pattern, tape speed, head drum diameter and other factors must be decided. The adjacent track correlation in the VHS format is 1.5 H. This 1.5 H difference is important not only for removing low frequency crosstalk from the luminance signal, but also for correcting color signal crosstalk in the SECAM system, for which phase shifting cannot be used.

Another advantage of H correlation is in avoiding skew distortion effects during special operating modes such as still, slow motion, 2x speed and shuttle search, when each video head traces two or more tracks. In these modes, the horizontal sync signals become played back at fixed intervals.

1.3 LUMINANCE SIGNAL RECORDING SYSTEM

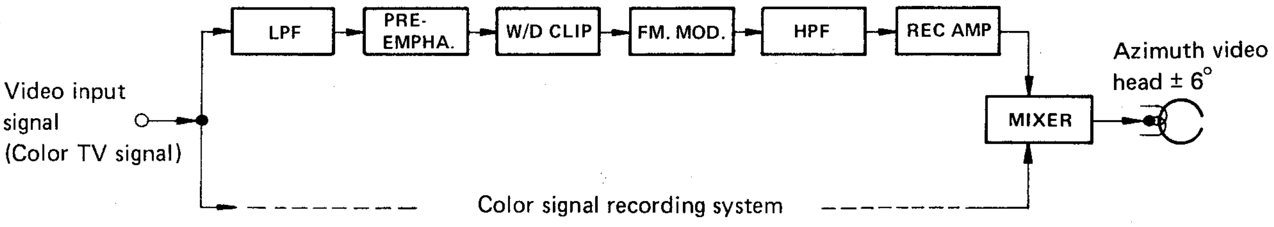


Fig. 1-3 Luminance signal recording system

Frequency modulation (FM) is used for the luminance signal recording system. A simplified block diagram of the system is shown in Fig. 1-3.

A lowpass filter (LPF) removes the color component and passes only the luminance component of the input color TV signal. At the next stage pre-emphasis circuit, the high frequency portion of the luminance signal is enhanced in order to improve S/N during FM recording. Since excess pre-emphasis could lead to black/white reversal due to the shortened recording wavelength, a white/dark clip circuit cuts the overshoot and undershoot components which exceed certain positive and negative levels.

The frequency modulator (FM MOD) converts the AM luminance signal to FM, which goes through a highpass filter (HPF) to the recording amplifier. These circuits amplify the signal with the proper frequency characteristic, after which it is mixed with the down converted color signal and supplied to the video heads.

1.3.1 Luminance Signal Recording Frequency Characteristic (LPF)

As shown in Fig. 1-4, when the video input is a color TV signal, a lowpass filter removes the color component and the luminance signal, with a bandwidth of from about 30 Hz to 3.0 MHz, is used. With some VHS models, when the input is a black and white TV signal, it bypasses the LPF, allowing a wider bandwidth to beyond 4 MHz.

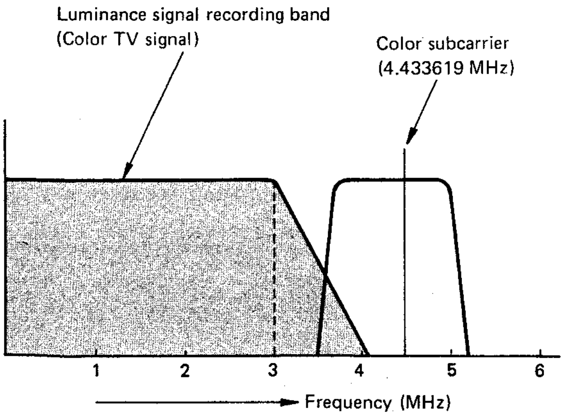
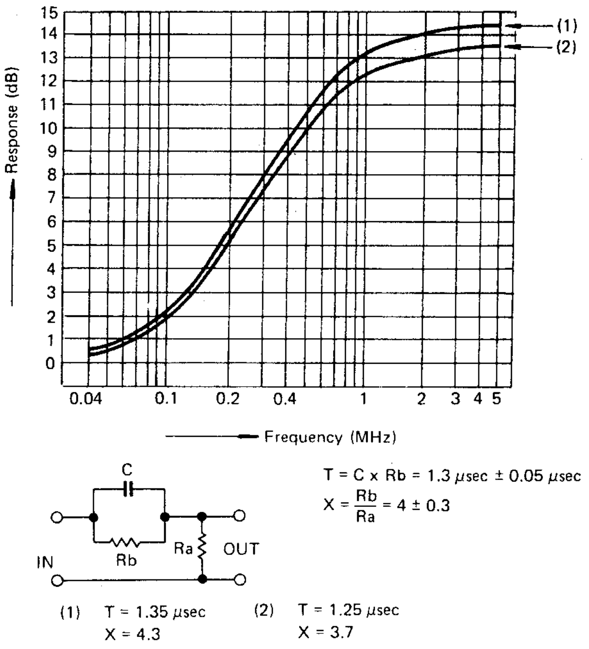


Fig. 1-4 Luminance signal recording band

1.3.2 Pre-emphasis Characteristics



T = C x Rb = 1.3 μsec ± 0.05 μsec

$X = \frac{Rb}{Ra} = 4 \pm 0.3$

(1) T = 1.35 μsec X = 4.3

(2) T = 1.25 μsec X = 3.7

Fig. 1-5 Pre-emphasis characteristics

1.3.3 White and Dark Clip Level (See Fig. 1-6.)

White clip level : 160^{+10}_{-50}% measured from sync tip

Dark clip level : 40 ± 10% measured from sync tip

Note: The level from sync tip to white peak is 100%.

1.3.4 FM Carrier Frequency and Deviation (See Fig. 1-6.)

Sync tip : 3.8 ± 0.1 MHz
White peak : 4.8 ± 0.1 MHz
Deviation : 1.0 ± 0.1 MHz

1.3.5 FM Signal Recording Frequency (HPF)

As indicated in Fig. 1-6, when the video input is a color TV signal, it goes through an HPF for vacating the area for the down converted color signal. With some VHS models, when the input is a B/W TV signal, the HPF can be bypassed to extend the bandwidth to the DC area.

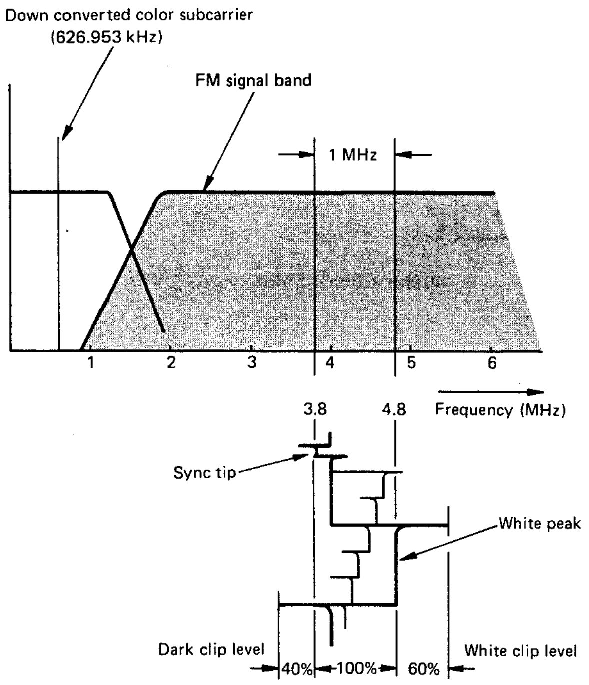


Fig. 1-6 Recording spectrum

1.3.6 FM Signal Recording Amp. Characteristics (REC AMP)

Current:

More than 3.8 MHz	: Optimum saturation recording current
2 MHz	: 3 ± 1 dB
1 MHz	: 6 ± 1 dB
Less than 1 MHz	: Flat characteristics

Note: 0 dB at 3.8 MHz

1.3.7 FM Signal Head Current (VIDEO HEAD)

It shall be within ±1.5 dB of 4 MHz optimum recording current.

1.4 LUMINANCE SIGNAL PLAYBACK SYSTEM

This system functions to return the signals recorded on the tape to a form as close as possible to the video input signals. The simplified block diagram is shown in Fig. 1-7.
The low level FM signals played back by the two video heads are combined into a single FM signal by the switching amplifier. After amplification to the required frequency characteristic, a highpass filter attenuates the down converted color signal and passes only the FM luminance signal. This HPF has the same response as that of the recording system.

Variations in the playback FM signal level due to mechanical stretching and contraction of the tape, and irregularities in tape to head contact, are corrected by the limiter circuit. The signal is amplified more than 80 dB to permit precise demodulation. A double limiter circuit is employed in order to prevent black/white reversal effects.
In the following stages, the demodulator and lowpass filter return the luminance signal to its AM form. The de-emphasis circuit reverses the emphasis applied during recording. From this point, the signal goes to the mixer where it is mixed with the playback color signal to become the video output signal.

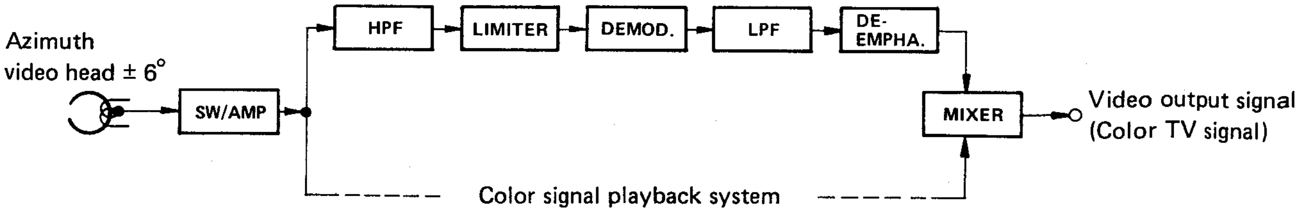


Fig. 1-7 Luminance signal playback system

1.5 COLOR SIGNAL RECORDING SYSTEM

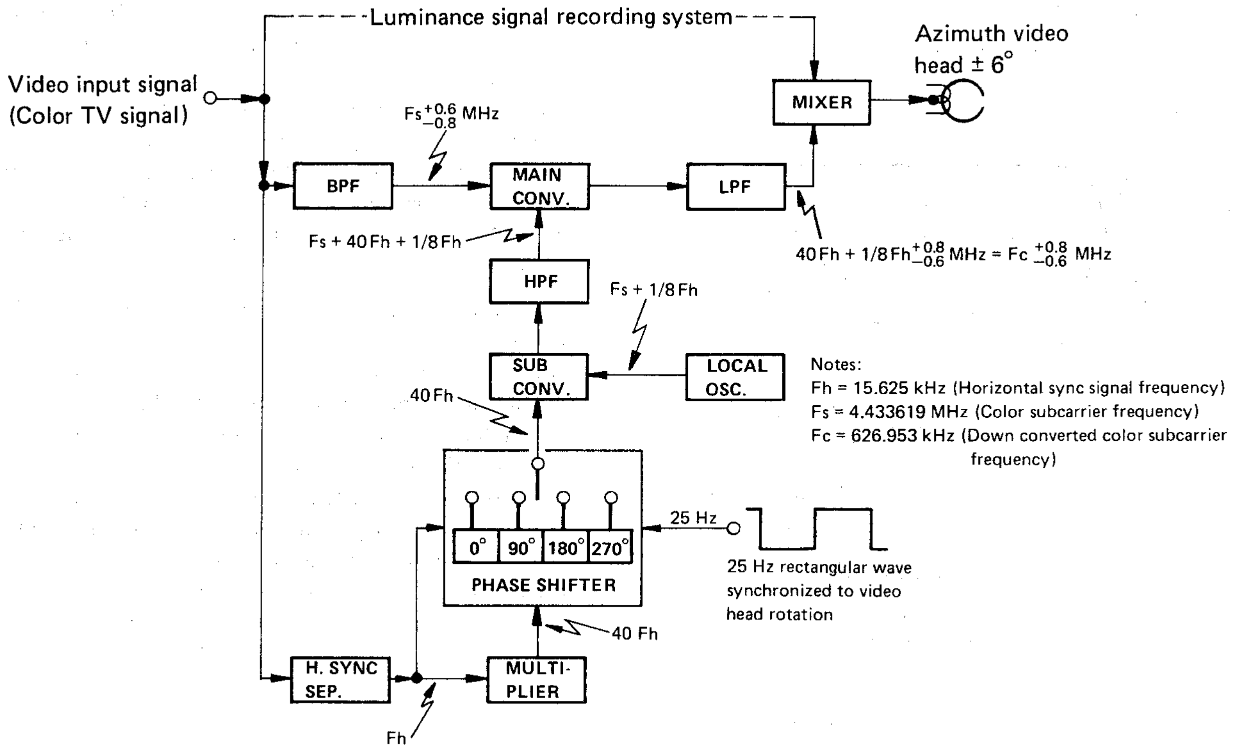

Luminance signal recording system
Video input signal
(Color TV signal)
Azimuth video head ± 6°
MIXER
Fs$^{+0.6}_{-0.8}$ MHz
BPF
MAIN CONV.
LPF
Fs + 40Fh + 1/8Fh
40Fh + 1/8Fh$^{+0.8}_{-0.6}$ MHz = Fc $^{+0.8}_{-0.6}$ MHz
HPF
Fs + 1/8Fh
SUB CONV.
LOCAL OSC.
40Fh
0°
90°
180°
270°
PHASE SHIFTER
25 Hz
25 Hz rectangular wave synchronized to video head rotation
40 Fh
H. SYNC SEP.
MULTI-PLIER
Fh
Notes:
Fh = 15.625 kHz (Horizontal sync signal frequency)
Fs = 4.433619 MHz (Color subcarrier frequency)
Fc = 626.953 kHz (Down converted color subcarrier frequency)

Fig. 1-8 Color signal recording system

This is a direct recording system using a down converted phase shifted color signal. The phase shift system removes color crosstalk which cannot be completely eliminated by the azimuth video heads. Fig. 1-8 illustrates a simplified block diagram of this system.

A bandpass filter (BPF) extracts the color component from the input video signal and supplies it to the main converter. At the same time, the input signal also goes to the horizontal sync separator, which supplies the 15.625 kHz (Fh) to the multiplier and phase shift circuits. Via the phase shifter, the 40 Fh CH-1 track component is supplied directly to the sub-converter, but the CH-2 component is delayed in phase 90° every line (1 H). A 25 Hz rectangular wave synchronized to the video head rotation is used for differentiating between the CH-1 and CH-2 components. Each line is also controlled by the Fh input.

The local oscillator produces the color subcarrier frequency 4.433619 MHz (Fs) + 1/8 Fh single frequency which goes to the sub-converter. At the sub-converter, the 40 Fh and (Fs + 1/8 Fh) are frequency converted to become (Fs + 40 Fh + 1/8 Fh). This is supplied through a highpass filter to the main converter. Also supplied to the main converter are the color signal Fs$^{+0.6}_{-0.8}$ MHz and carrier wave (Fs + 40 Fh + 1/8 Fh). These are down converted to become (40 Fh + 1/8 Fh $^{+0.8}_{-0.6}$ MHz) which through a lowpass filter goes to the mixer for mixing with the FM luminance signal. The result is applied to the video heads.

In other words, the 4.433619 MHz (Fc) color subcarrier is converted to a low band of 626.953 kHz (40 Fh + 1/8 Fh). The down converted color signal is then recorded directly using the FM luminance signal as AC bias.

1.5.1 Color Crosstalk Correction by Phase Shift System

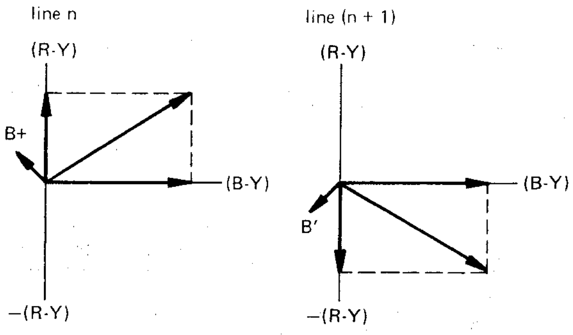

line n
(R-Y)
B+
(B-Y)
−(R-Y)
line (n + 1)
(R-Y)
B′
(B-Y)
−(R-Y)

Fig. 1-9 Vector of color signal

A Synchronous quadrature modulation system is employed in which the phase of the color signal R-Y component is reversed every line in order to prevent transmission distortion.

The color signal indicated in Fig. 1-9 is converted to a low-band.

While the CH-1 track component is recorded with phase unchanged, the phase of the CH-2 track component is delayed 90° every line. Fig. 1-10 illustrates the principle of this phase shift system.

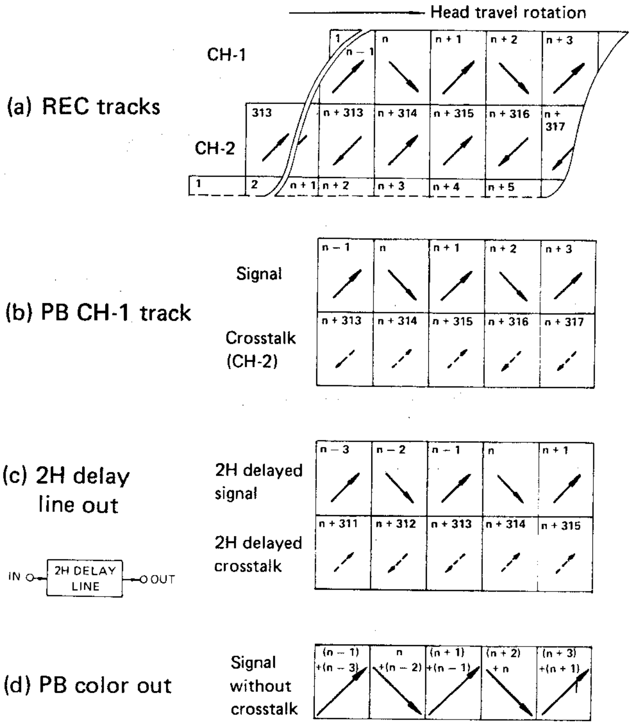

Head travel rotation
(a) REC tracks
CH-1
CH-2
(b) PB CH-1 track
Signal
Crosstalk (CH-2)
(c) 2H delay line out
2H delayed signal
2H delayed crosstalk
IN
2H DELAY LINE
OUT
(d) PB color out
Signal without crosstalk
n − 1
n
n + 1
n + 2
n + 3
n + 313
n + 314
n + 315
n + 316
n + 317

Fig. 1-10 Phase shift system

In the figure, (a) indicates the phase shifted recording pattern. Since the CH-1 head pattern is not phase shifted, the R-Y component phase becomes inverted every line. The phase of the CH-2 head pattern is delayed every line and this causes its R-Y component phase to become inverted every two lines.

During playback, when the CH-1 head picks up a portion of the CH-2 track signal, this becomes the crosstalk component. Phase shift is not required for the main signal from the CH-1 track, and this output is shown by (b). The dotted arrows indicate the crosstalk component and, as can be noted, the phase reverses every 2 lines.

Passing signal (b) through a 2H delay line yields signal (c). In comparing signals (b) and (c), the main signal phase is the same every line, but the crosstalk phase reverses. Therefore, by mixing signals (b) and (c), the crosstalk component of the adjacent track can be removed to result in the playback color signal (d).

In other words, the color signal can be considered in 2H units. It is recorded by the phase shift system and during playback, the signal through a 2H delay line is mixed to remove crosstalk.

Crosstalk in the playback color signal (d) effectively becomes zero, while the main signal is enhanced to improve S/N. Also, the CH-2 head playback phase is advanced 90° every line (opposite to recording), produring the same effect. A digital type system is used for phase shifting.

1.5.2 Down Converted Color Subcarrier Frequency

The color subcarrier frequency (Fs) can be expressed as:

$$Fs = (n - 1/4)Fh + 1/625\,Fh = 283.75\,Fh + 25\,Hz\ (n = 284)$$
$$= 4.433619\ MHz$$

A line offset system is used in which the subcarrier phase is delayed 90° every line. This avoids serious color noise when the color signal is displayed on a monochrome TV receiver. 25 Hz is added in order to prevent crosscolor.

As indicated in Fig. 1-10, the phase of the color signal R-Y component is inverted every horizontal line to compose a synchronous quadrature modulated signal. Fig. 1-11 shows this color signal spectrum.

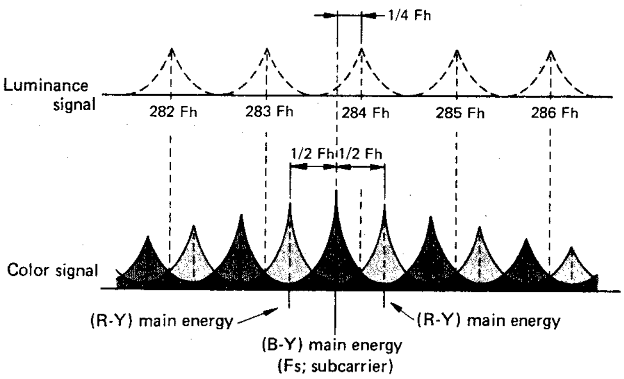

1/4 Fh
Luminance signal
282 Fh
283 Fh
284 Fh
285 Fh
286 Fh
1/2 Fh
1/2 Fh
Color signal
(R-Y) main energy
(B-Y) main energy
(Fs; subcarrier)
(R-Y) main energy

Fig. 1-11 Spectrum of color signal

In the phase shift system, the CH-1 component of the down converted color signal is distributed at 1/2 Fh intervals centered on the Fc (down converted color subcarrier) component. The CH-2 track component is delayed in phase 90° every line, deviated by 1/4 Fh, and distributed at 1/2 Fh intervals centered on Fc. This spectrum is shown in Fig. 1-12.

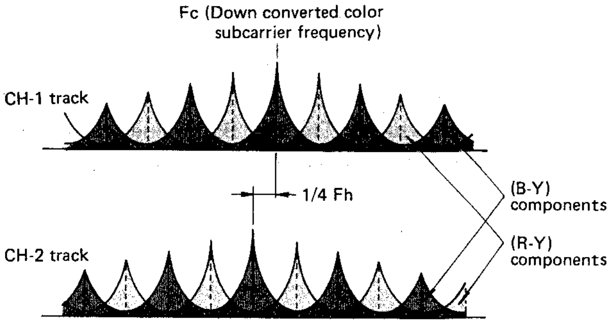

Fc (Down converted color subcarrier frequency)
CH-1 track
1/4 Fh
(B-Y) components
(R-Y) components
CH-2 track

Fig. 1-12 Spectrum of down converted color signal

The FM luminance and down converted color signals are mixed to become the recording current. When recorded and played back using magnetic tape, which possesses 3-dimensional distortion and nonlinearity, interference in the form of $F_O + 2F_{DC}$ (F_O: FM carrier; F_{DC} : down converted color signal) becomes introduced and cannot be ignored. When the $2F_{DC}$ component is detected and demodulated, beat becomes produced with respect to the luminance signal and appears in the picture. Therefore, as with the color signal, F_C (down converted color subcarrier frequency) must be selected so that the $2F_{DC}$ component becomes 1/4 offset in relation to the luminance signal, i.e.:

$$2F_C = \frac{2n-1}{4} Fh$$

$$F_C = \frac{2n-1}{8} Fh = {}^{321}\, Fh = 40\,Fh + \frac{1}{8} Fh \quad (n = 161)$$

$$= 625 + 1.953 = 626.953\ \text{kHz}$$

When F_C is determined at (40Fh + 1/8Fh), the spectrum of the CH-1 track B-Y component appears at (nFh + 1/8Fh) and the R-Y component at (nFh − 3/8Fh). In the CH-2 track distribution, B-Y appears at (nFh − 1/8 Fh) and R-Y at (nFh − 5/8 Fh).

Fig. 1-13 shows the $2F_{DC}$ component spectrum with respect to the playback luminance signal at this time.

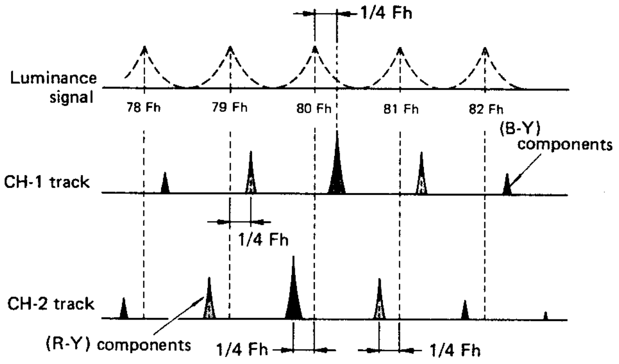


Fig. 1-13 $2F_{DC}$ playback spectrum

The $2F_{DC}$ components for both CH-1 and CH-2 become 1/4 line offset with respect to the luminance signal and thereby visually reduced. The 626.953 value was selected for both reducing noise and in consideration of color bandwidth.

1.5.3 Color Signal Recording Bandwidth

Response curves for the highpass and lowpass filters are indicated in Fig. 1-14.

Constant current characteristics are possessed by the down converted color signal recording current.

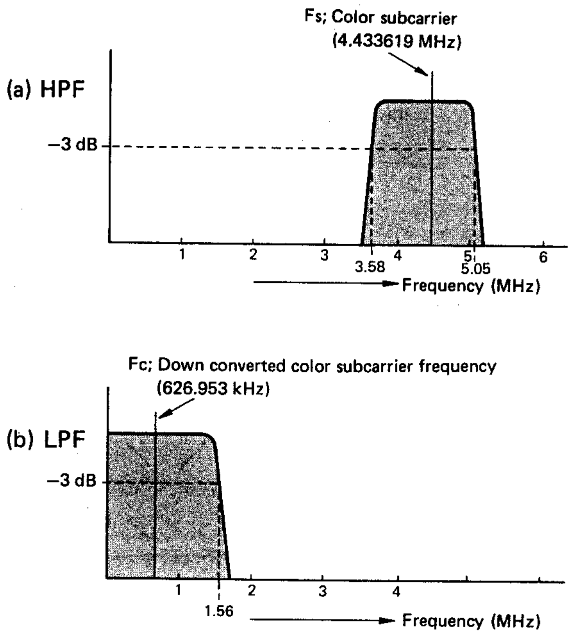


Fig. 1-14 Color signal recording bandwidth

1.6 COLOR SIGNAL PLAYBACK SYSTEM

The color signal playback system performs essentially the opposite function as the recording system. In addition, however, important corrections must be performed for color signal frequency and phase errors introduced by variations in tape speed and head rotation, and elasticity of the tape.
Fig. 1-15 indicates an abbreviated block diagram of this system.
Through a lowpass filter, the down converted color signal goes to the main converter. At this time, the down converted color subcarrier (F_C) contains an error component ($40Fh' + 1/8Fh' \pm \Delta f$) due to mechanical factors of the heads and tape. Fh' varies with the tape speed as $Fh \pm \Delta Fh$. Δf is the instantaneous error caused by head rotation irregularities and tape elongation and contraction.
Correction of the color time axis is performed using two two types of data. These are 1) color burst signal phase and 2) horizontal sync signal frequency.

In the first loop, the burst component is separated from the color signal and compared with a reference frequency.

The second loop separates the horizontal sync signal from the video signal for comparison with the output of the 160 Fh VCO (voltage controlled oscillator).

The outputs of the above loops are mixed and control the 160 Fh VCO. The VCO output is counted down and applied to the phase shifter.

The phase shifter is controlled by the 25 Hz field pulse. Its output is the converter carrier ($Fs + 40\,Fh' + 1/8\,Fh' \pm \Delta f$), which includes the phase and frequency error component.
By frequency conversion with Fc, the color subcarrier frequency of 4.433619 MHz, which is free from frequency and phase deviations, becomes obtained through a bandpass filter. In the opposite manner as with recording, the phase shifter advances the CH-2 track phase 90° every line and 40 Fh' is supplied to the sub-converter. The playback color signal through the main converter and bandpass filter is applied to a 2H delay line for removing crosstalk. Characteristics of the lowpass and bandpass filters are the same as those for recording (Fig. 1-15).
At the mixer, the playback color and luminance signals are mixed to become the video output signal.

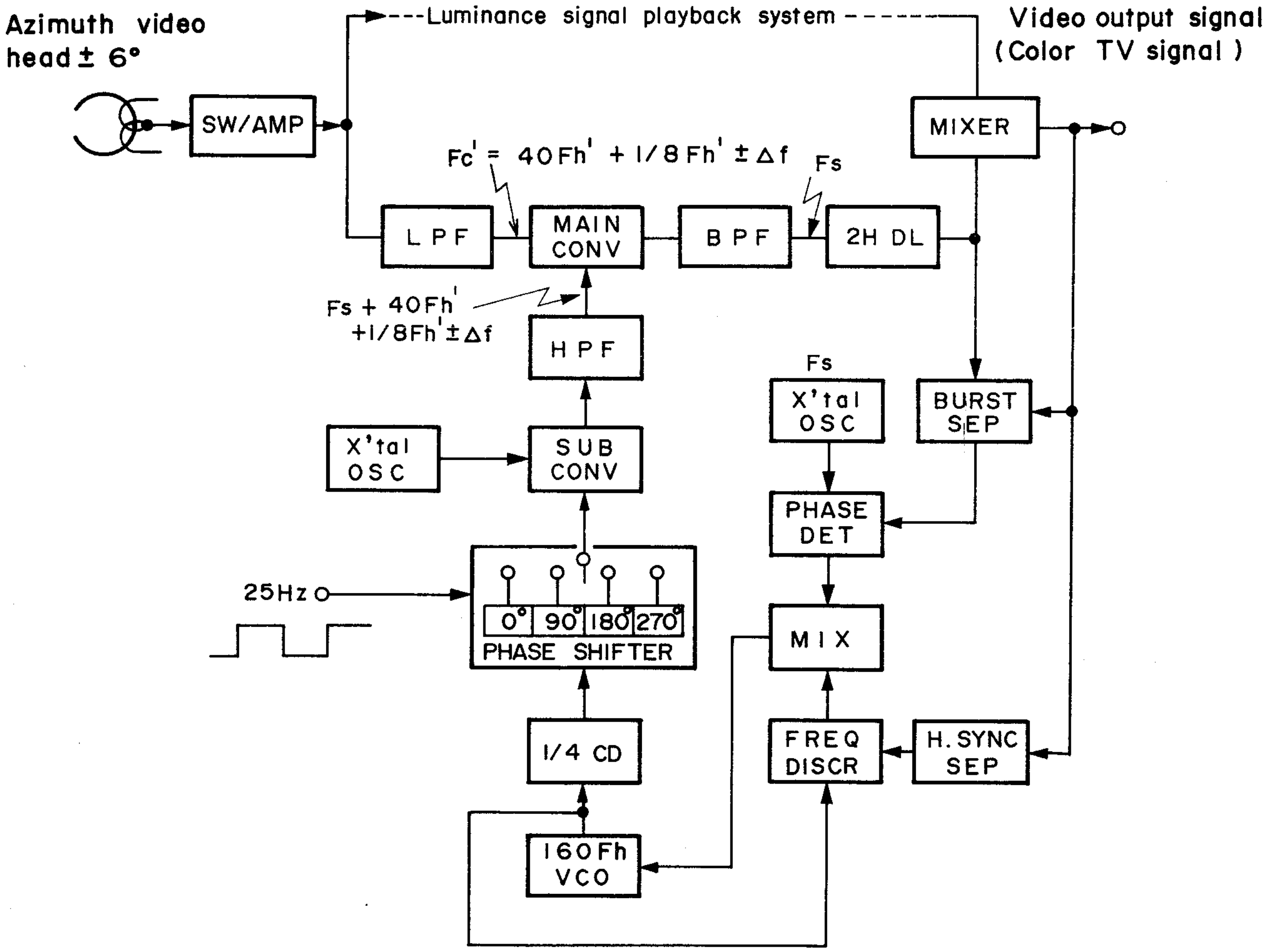

Azimuth video head ± 6°
SW/AMP
Luminance signal playback system
Video output signal (Color TV signal)
MIXER
Fc' = 40Fh' + 1/8Fh' ± Δf
Fs
LPF
MAIN CONV
BPF
2H DL
Fs + 40Fh' +1/8Fh' ± Δf
HPF
Fs
X'tal OSC
BURST SEP
X'tal OSC
SUB CONV
PHASE DET
25Hz
0° 90° 180° 270°
PHASE SHIFTER
MIX
1/4 CD
FREQ DISCR
H. SYNC SEP
160Fh VCO

Fig. 1-15 Color signal playback system

1.7 CONTROL SIGNAL RECORDING SYSTEM

Control signal waveform, polarity and video head relationships are indicated in Fig. 1-16.

Phase of the control signal is the same as the vertical sync signal rise component of the CH-1 track. The positive pulse voltage is the reference 25 Hz.

The control signal is recorded on the control track above the saturation recording level.

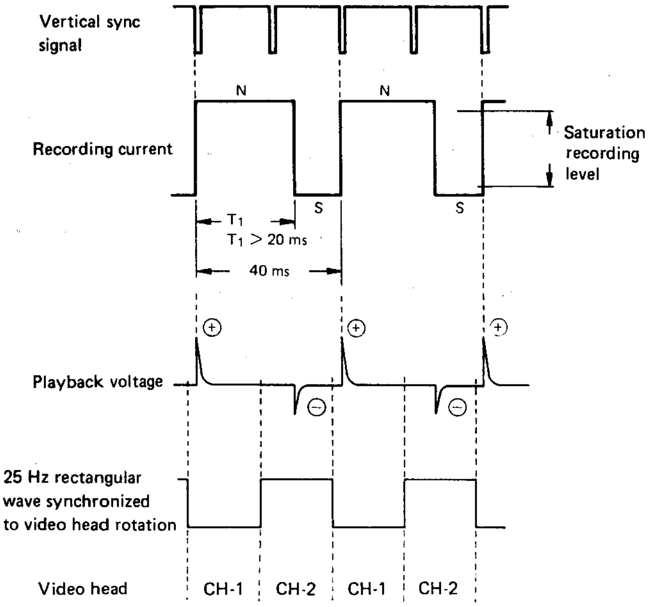

Vertical sync signal
N
N
Recording current
Saturation recording level
S
S
T1
T1 > 20 ms
40 ms
⊕
⊕
⊕
Playback voltage
⊖
⊖
25 Hz rectangular wave synchronized to video head rotation
Video head
CH-1
CH-2
CH-1
CH-2

Fig. 1-16 Control signal

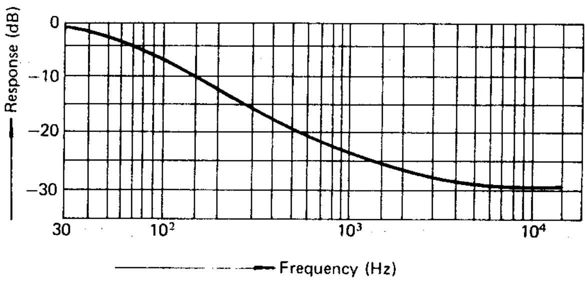
1.8 AUDIO SIGNAL RECORDING SYSTEM

1.8.1 Audio Signal Recording Level

Audio signal is recorded on the audio track to the defined level using an AC bias current recording system.

1.8.2 Audio Signal Recording Current Characteristics

The equalizing amplifier controls the recording current in order to obtain a flat frequency characteristic in the reproduced output. See Fig. 1-17.



T_1 = 3180 μsec, T_2 = 120 μsec

Fig. 1-17 Audio equalizing frequency characteristics

1.9 CASSETTE

1.9.1 Video Tape

Length : The relationship between tape length and time for recording and playback can be defined by the formula:

$$L = [1.42t + 2]^{+3}_{0}$$

where, L : tape length (m)

t : recording or playback time (minutes)

Note: L shall be an integer obtained after all decimals produced in calculation are raised. (See "Reference Table".)

Width : 12.65 ± 0.01 mm
Fluctuation : less than 6 µm
Thickness : 19^{+1}_{-2} µm
Coercivity : 600 oersted class (nominal)
Optimum recording current shall not differ from the standard tape.

[Reference Table]

Kinds of Blank Cassettes

Kind of cassette	Recording or playback time	Length of video tape
E-240	240 min.	344^{+2}_{-1} m
E-180	180 min.	258^{+3}_{0} m
E-150	150 min.	215^{+3}_{0} m
E-120	120 min.	173^{+3}_{0} m
E-90	90 min.	130^{+3}_{0} m
E-60	60 min.	88^{+3}_{0} m
E-30	30 min.	45^{+3}_{0} m

1.9.2 Leader Tape and Trailer Tape

Length : In case time for recording or playback is:
over 90 minutes : 170 ± 20 mm
just or under 90 minutes : 150 ± 20 mm
Width : 12.65 ± 0.03 mm
Thickness : 40^{+5}_{-25} µm
Material : Polyester film
Transparency : more than 50%.
Length of splicing: 12 ~ 19 mm
Gap of splicing : 0 ~ 70 µm
Splicing force : more than 3 kg

1.9.3 Reel

Outside diameter : 89 ± 0.2 mm
Hub diameter : In case time for recording or playback is:
over 90 minutes : 26 ± 0.15 mm
just or under 90 minutes : 62 ± 0.2 mm
(If just or under 30 minutes, it can be 70 ± 0.2 mm.)
E-value : more than 1.5 mm

1.9.4 Simplified Illustrations

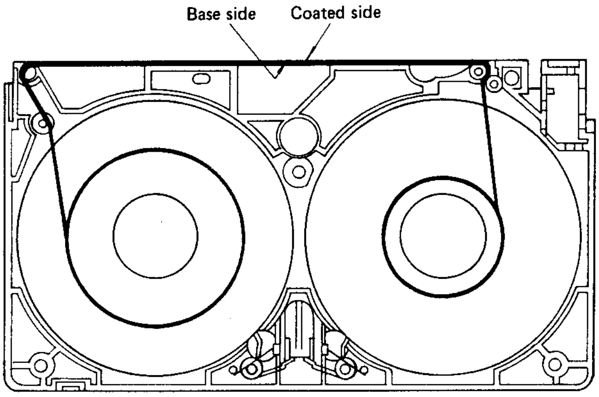

Base side
Coated side

Fig. 1-18 Tape winding and tape path

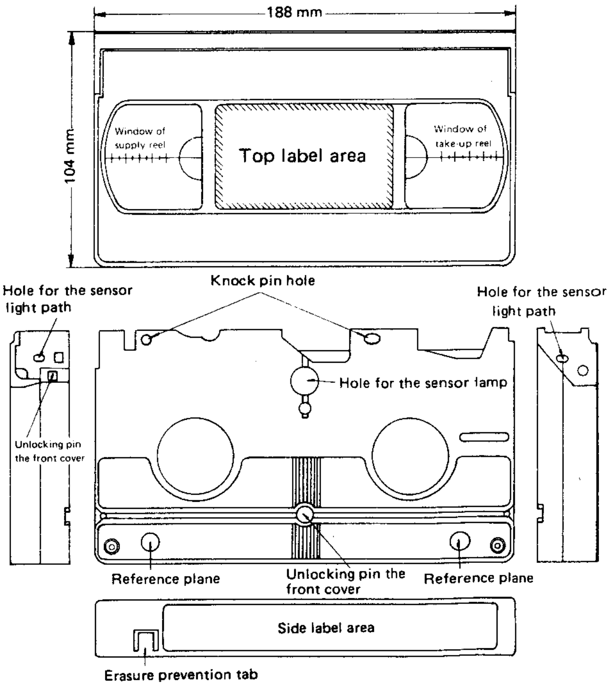

188 mm
104 mm
Window of supply reel
Top label area
Window of take-up reel
Hole for the sensor light path
Knock pin hole
Hole for the sensor light path
Hole for the sensor lamp
Unlocking pin the front cover
Reference plane
Unlocking pin the front cover
Reference plane
Side label area
Erasure prevention tab

Fig. 1-19 Cassette appearance

SECTION 2
MECHANICAL ADJUSTMENT

2.1 GENERAL

2.1.1 Precautions

- IMPORTANT

1. Disconnect from power before removing or soldering components.
2. The tape transport mechanism has been precisely adjusted at the factory and ordinarily does not require readjustment.
3. Tighten the screws carefully to avoid damage to the chassis.
4. For service procedures that call for operation of the set without loading a tape around the head drum, disable the START and END sensors by applying opaque covers.

2.1.2 Required Test Equipment, Jigs and Tools

For proper mechanical adjustment, the following test equipment, jigs and tools are strongly recommended. Without them, a long trial-and-error period would be necessary, resulting in possible damage. In addition, general-purpose tools and a metric hex key (obtain locally) are required.

1. Test equipment required:

Color television or monitor
Oscilloscope (wide-band, dual trace, triggered, delayed sweep)
Recording tape
Alignment tapes & selfrecording tapes

Cord Color	Connection
SKY BLUE	MULTI CONNECTOR – $\boxed{0}\boxed{2}$ CN12
GREEN	MULTI CONNECTOR – $\boxed{0}\boxed{2}$ CN11
RED	$\boxed{0}\boxed{3}$ CN3 – A/C HEAD
BLACK	$\boxed{0}\boxed{9}$ CN1 – $\boxed{0}\boxed{2}$ CN7
YELLOW	$\boxed{0}\boxed{6}$ CN1 – $\boxed{0}\boxed{2}$ CN6
WHITE	$\boxed{0}\boxed{3}$ CN6 – $\boxed{0}\boxed{4}$ CN1
PINK	$\boxed{0}\boxed{3}$ CN2 – $\boxed{0}\boxed{2}$ CN9
BROWN	$\boxed{0}\boxed{3}$ CN1 – $\boxed{0}\boxed{2}$ CN8
ORANGE	$\boxed{0}\boxed{1}$ CN4 – $\boxed{0}\boxed{2}$ CN14
BLUE	$\boxed{0}\boxed{1}$ CN3 – $\boxed{0}\boxed{2}$ CN3
VIOLET	$\boxed{0}\boxed{1}$ CN2 – $\boxed{0}\boxed{2}$ CN2
GRAY	$\boxed{0}\boxed{1}$ CN1 – $\boxed{0}\boxed{2}$ CN1

Table 2-2 Patch cord connection

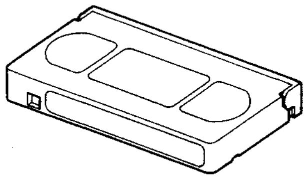
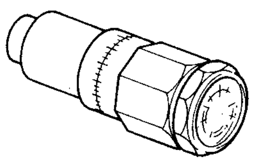
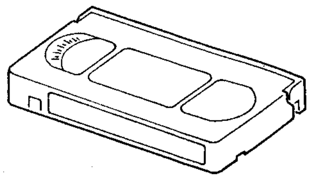
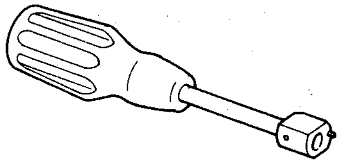
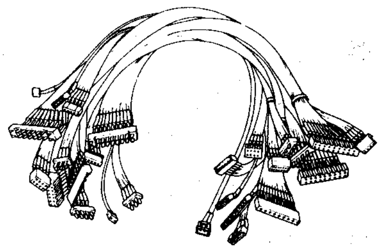
Alignment tapes MH-2 (Self Recording tapes E-180) 	Torque gauge assembly PUJ48075-2 	Back tension cassette gauge PUJ48076 
A/C head position tool PUJ47351-2 	Patch cord PUJ36857 	

Table 2-1 Jigs and tools

2.1.3 Disassembly

1. Out side covers

– DISASSEMBLY PROCEDURE REMVOING ORDER –

Knob (TRACKING)
↓
Bottom Screws (B)
↓
Side Plates (both side)
↓
Bottom Cover → Cassette Cover
↓
Front Panel

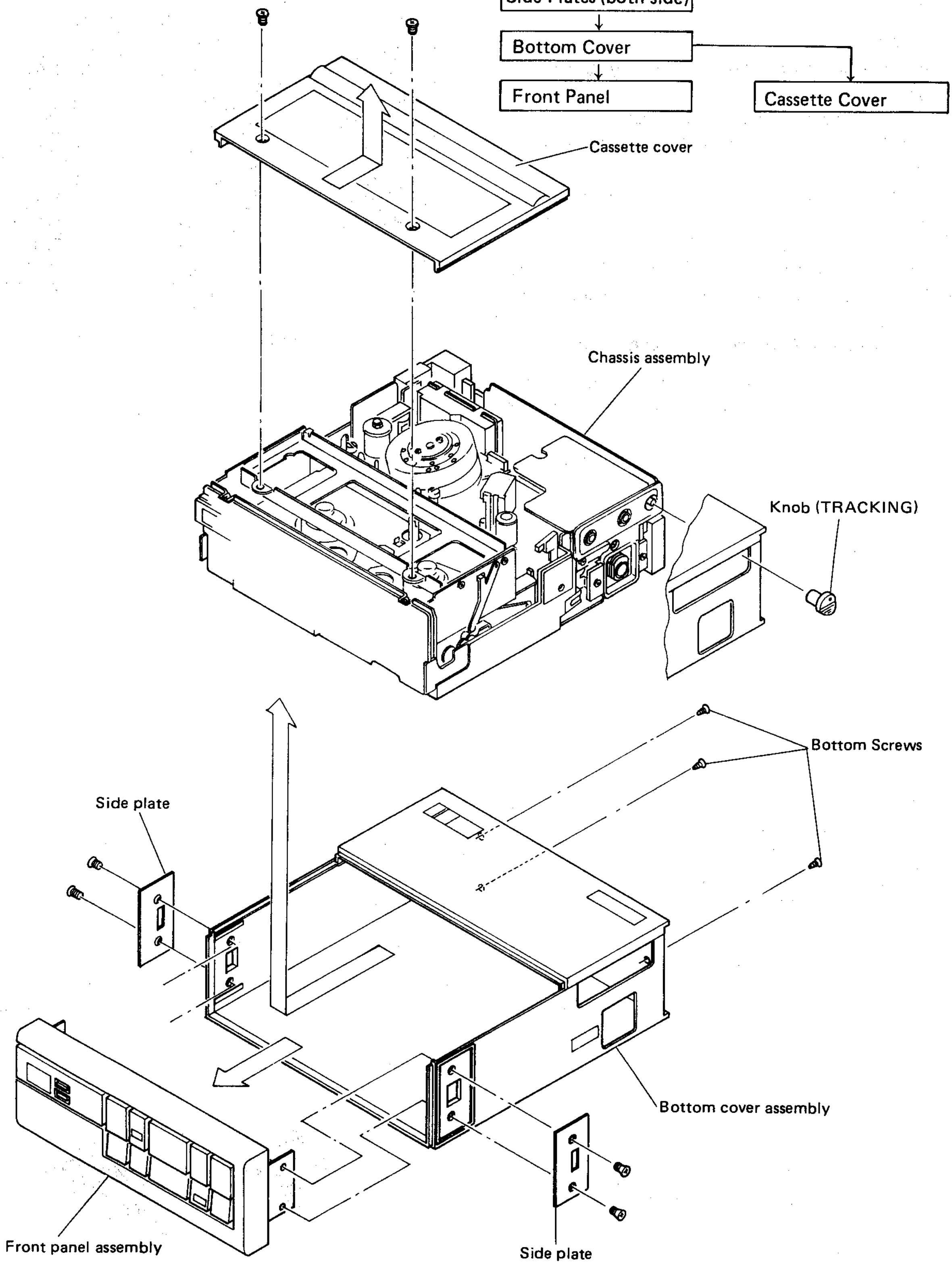
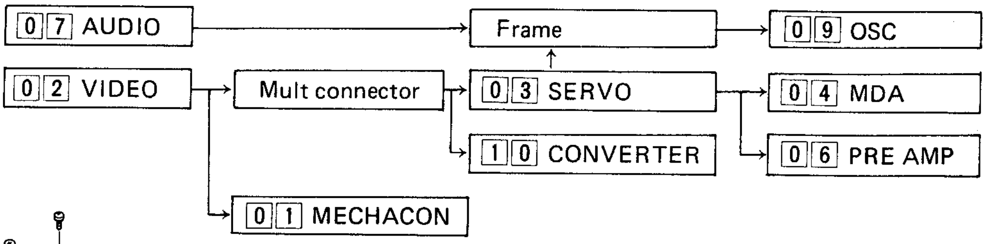
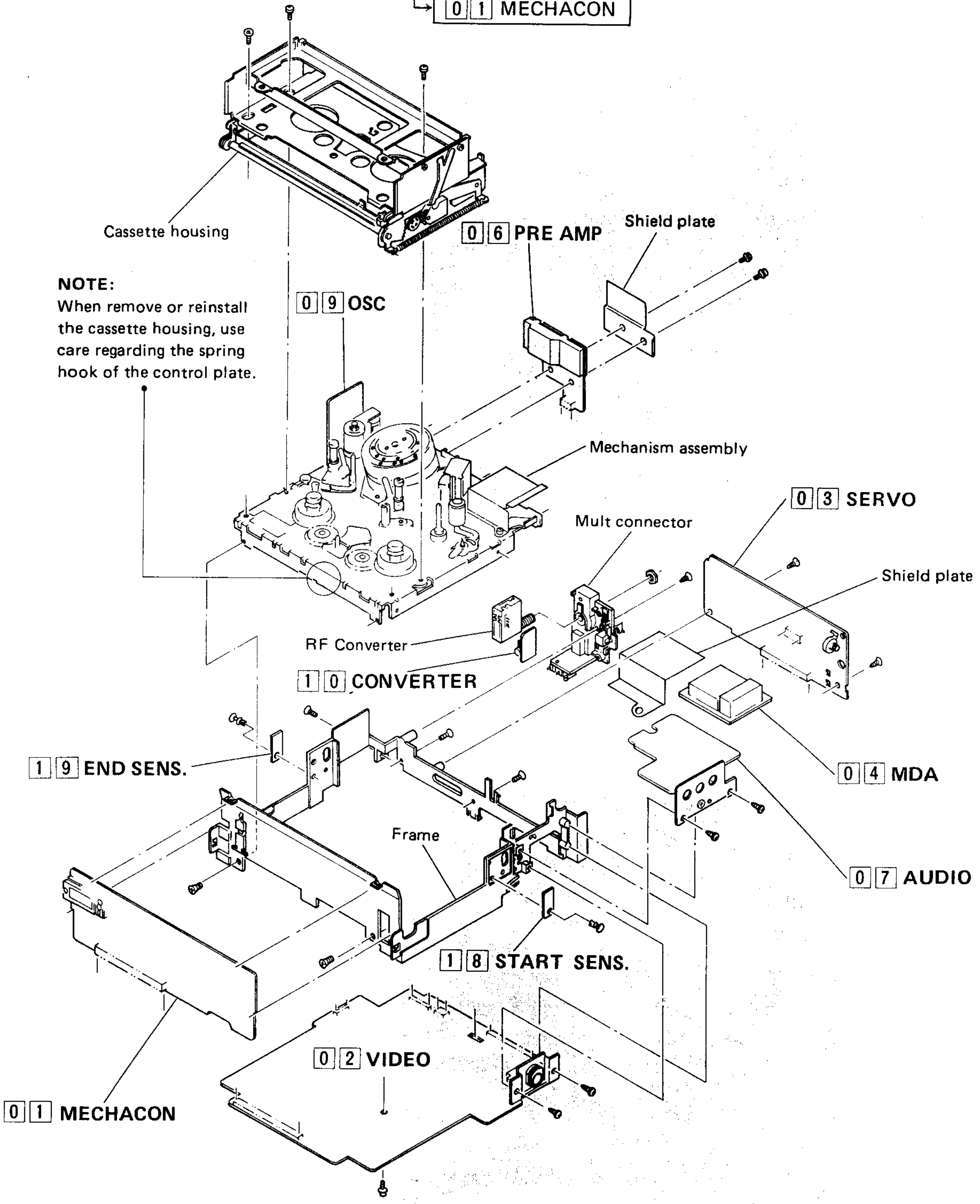

Cassette cover
Chassis assembly
Knob (TRACKING)
Bottom Screws
Side plate
Bottom cover assembly
Front panel assembly
Side plate

Fig. 2-1 External covers

2. Main circuit boards

– REMOVING ORDER –


07 AUDIO
Frame
09 OSC
02 VIDEO
Mult connector
03 SERVO
04 MDA
10 CONVERTER
06 PRE AMP
01 MECHACON


Cassette housing
06 PRE AMP
Shield plate
09 OSC
Mechanism assembly
03 SERVO
Mult connector
Shield plate
RF Converter
10 CONVERTER
19 END SENS.
04 MDA
Frame
07 AUDIO
18 START SENS.
02 VIDEO
01 MECHACON

NOTE:
When remove or reinstall the cassette housing, use care regarding the spring hook of the control plate.

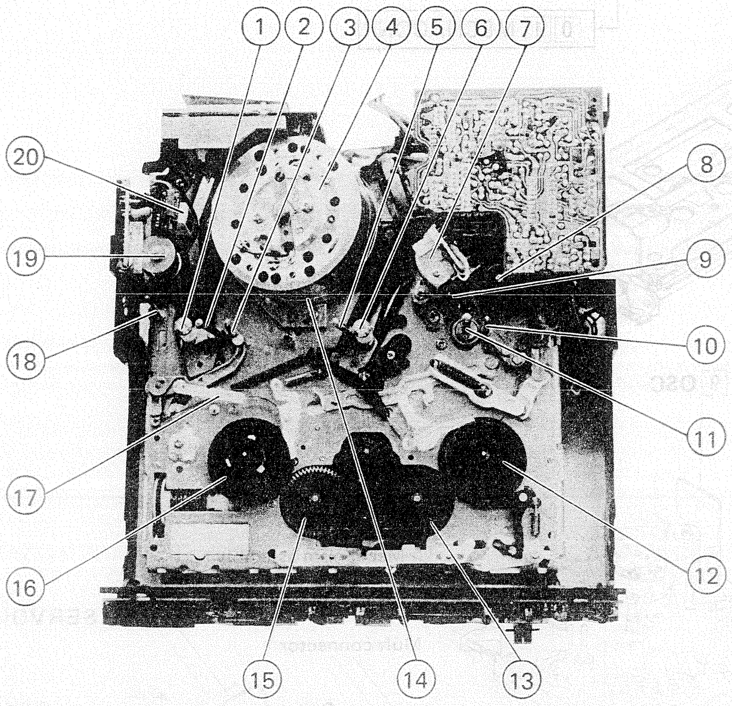
Fig. 2-2 Main circuit boards

2.2 PERIODIC MAINTENANCE

The following procedures are recommended for maintaining optimum performance and reliability of this video cassette recorder.

2.2.1 Layout of Maintenance Parts

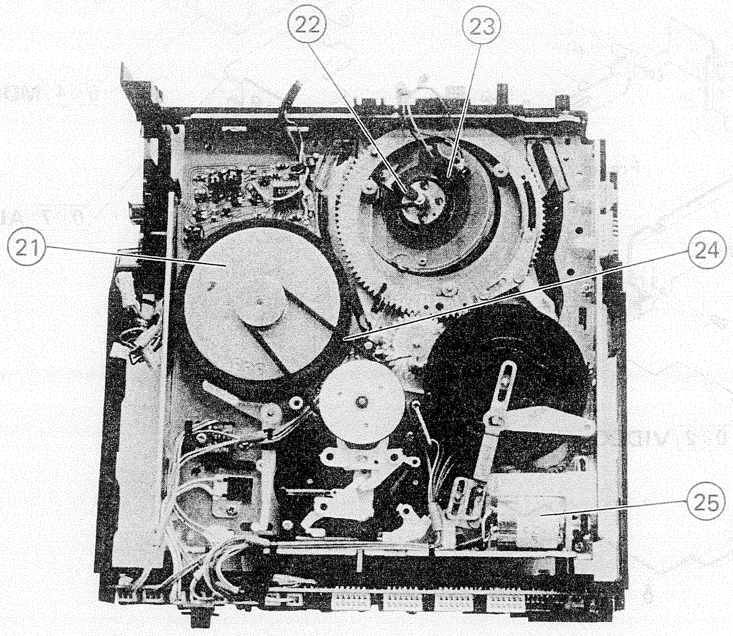
1. Top view



1. SUP guide roller
2. SUP slant pole
3. Tension pole
4. Upper drum
5. TU slant pole
6. TU guide roller
7. Audio/Control head
8. Pinch roller
9. TU guide pole
10. TU guide pin
11. Capstan
12. TU reel disk
13. TU clutch
14. Lower drum
15. SUP clutch
16. SUP reel disk
17. Tension band
18. SUP guide pin
19. Impedance roller
20. Full erase head

Fig. 2-3 Top view

2. Bottom view



21. Capstan motor
22. Brush
23. Pick-up head
24. Reel belt
25. Mode control motor

Fig. 2-4 Bottom view

2.2.2 Service Schedule for Main Components

The following table lists the parts which should receive periodic servicing at the recommended intervals.

	Part Name	Replacement Part No.	Periodic Service Schedule (Operating Hours)										Reference Section	Remarks
			500	1000	1500	2000	2500	3000	3500	4000	4500	5000		
Tape transport system	Tension pole SUP slant pole SUP guide roller SUP guide pin Impedance roller TU guide pole Capstan TU guide pin TU guide roller TU slant pole Lower drum		☆	☆	☆	☆	☆	☆	☆	☆	☆	☆		● For cleaning, use a lint-free cloth or gauze dampened with alcohol. ● After cleaning with alcohol, allow the parts to dry thoroughly before using a cassette tape.
	Upper drum		☆	○	●	☆	○	●	☆	○	●	☆	2.3.1	—When cleaning the head tips on the upper drum, do not clean them with a vertical stroke. Use only a gentle back and forth motion in the direction of the tape path.
	Full erase head		☆	☆	☆	☆	☆	☆	☆	☆	☆	○	2.3.2	
	Audio/control head		☆	☆	☆	☆	☆	●	☆	☆	☆	☆	2.3.3	
	Pinch roller		☆	☆	☆	☆	☆	●	☆	☆	☆	☆	2.3.4	
Drive system	Capstan motor											○	2.3.5	
	Reel belt					●				●				
	Motor bracket (Mode control motor) (Belt)											○	2.3.6	
	SUP reel disk					△				△		○	2.3.7	—Do not over lubricate.
	TU reel disk													
	TU clutch			○		○		○		○		○	2.3.8	Torque check —(Refer to section 2.4.3.)
	SUP clutch													
Others	Brush		☆	☆	☆	☆	☆	☆	☆	☆	☆	○	2.3.9	
	Tension band			○		○		○		○		○	2.3.10	—Back tension check (Refer to section 2.4.4.)

☆ Cleaning ● Replacement △ Lubrication ○ Check and Replace if necessary.

Table 2-3 Standard service periods

Above replacement times will vary greatly according to environmental and usage conditions. Routine inspection and maintenance are also important factors that influence the unit life. Note that rubber parts may become aged or deformed after long periods of storage, even if the unit is not used.

Note: Even if the unit is not used frequently, cleaning, lubrication and replacement of the belts should be undertaken every 2 years.

2.3 MAIN ASSEMBLY REPLACEMENT

Remove the external covers, circuit boards and cassette housing, as necessary, to allow replacement.

2.3.1 Upper Drum (See Figure 2-5.)

1. Unsolder four wires connecting the lower drum from the relay pins of the upper drum (perform quickly to avoid damaging the wires).

Relay Pin Color	Channel	Inner/Outer
Brown	CH-1	Brown/Gray
Red	CH-2	Red/White

Table 2-4 Upper drum wiring

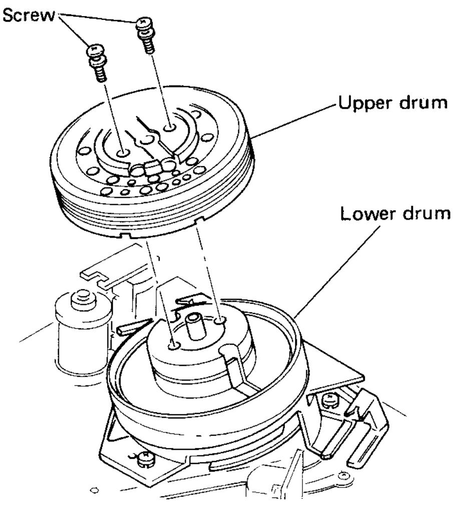


Fig. 2-5 Upper drum replacement

2. Take out two screws and remove the upper drum by lifting it upwards.
3. Use alcohol to clean the lower face of new upper drum and the upper face of the lower drum.
   When handling and installing the new upper drum, avoid directly touching the head tips and use care not to scratch the drum.
4. Reassemble by reversing the above steps. When resoldering, observe the correct channels (refer to Table 2-4) and avoid overheating the wires.
5. Perform the upper drum eccentricity adjustment.
   1) Connect an oscilloscope to TP-PB. FM (FM OUT) of the SERVO board. Trigger the oscilloscope externally with the signal from TP-11 (DRUM F.F.) of the SERVO board.
   2) Supply a video signal, then playback.
   3) Observe the FM waveform, confirm that the FM waveform becomes flat. If the waveform becomes as shown in Figure 2-6, reinstallation of the upper drum is required.

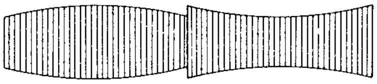


Fig. 2-6 Incorrect example

6. Perform the FM waveform checks and adjustments (refer to section 2.4.6).
7. Perform the P.B./REC switching point adjustments. Refer to sections 3.5.5, 3.5.6 and 3.5.9.

2.3.2 Full Erase Head (See Figure 2-7.)

1. Take out the nut and remove the flanges, washers, impedance roller, collar and spring.
2. Disconnect connector CN2 from the OSC board.
3. Unhook the torsion spring from the F.E. head and remove the F.E. head upwards.
4. Install a new F.E. head and reassemble the other parts into their original positions.
5. Perform the impedance roller height/FM waveform checks and adjustments (refer to sections 2.4.5 and 2.4.6).

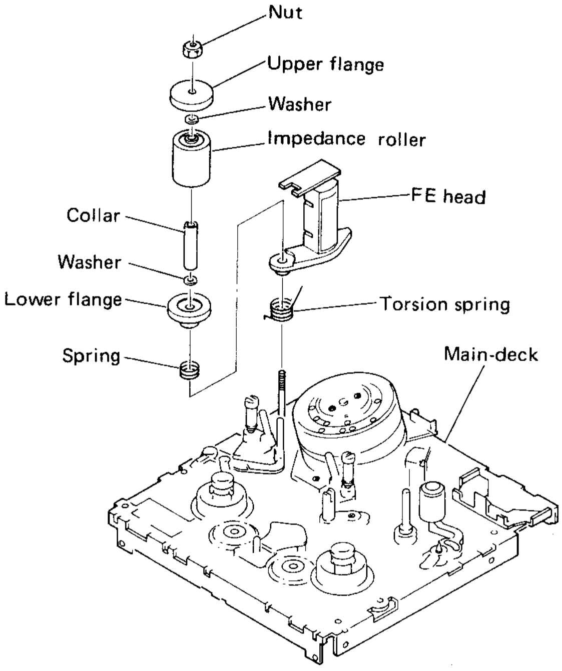


Fig. 2-7 F.E. head replacement

2.3.3 Audio/Control Head (See Figure 2-8.)

1. Take out the screw and remove the shield cover.
2. Disconnect two connectors CN4 and CN5 from the AUDIO board, disconnect connector CN3 from the SERVO board.
3. Take out two screws and remove the A/C head.
4. Replace the A/C head and reassemble by reversing the above steps.

5. Perform the A/C head inclination/interchangeability checks and adjustments (refer to sections 2.4.5 and 2.4.6).
6. Install the shield cover into its original position.

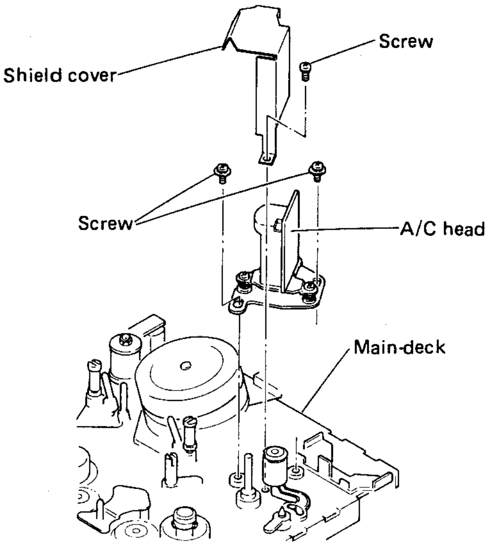

Shield cover
Screw
Screw
A/C head
Main-deck

Fig. 2-8 A/C head replacement

2.3.4 **Pinch Roller** (See Figure 2-9.)

1. Take out the screw, and remove the pinch roller, collar and PR cap.
2. Replace the pinch roller and reassemble by reversing the above steps.

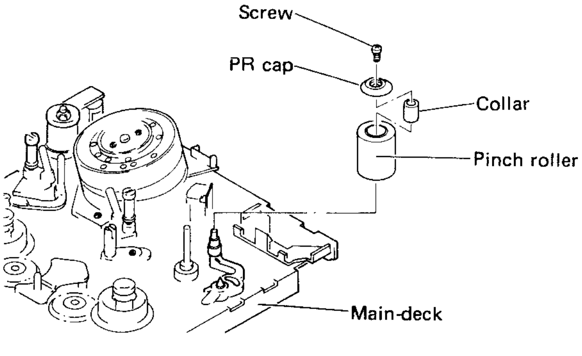

Screw
PR cap
Collar
Pinch roller
Main-deck

Fig. 2-9 Pinch roller replacement

2.3.5 **Capstan Motor** (See Figure 2-10.)

1. Disengage the reel belt from the capstan motor, and disconnect connector CN4 from the SERVO board.
2. Take out three screws and remove the capstan motor downwards. Use care regarding the capstan brake when removing the capstan motor.
3. Replace the capstan motor and reassemble by reversing the above steps.
4. Perform the capstan DISCR. position adjustments. Refer to sections 3.5.2.

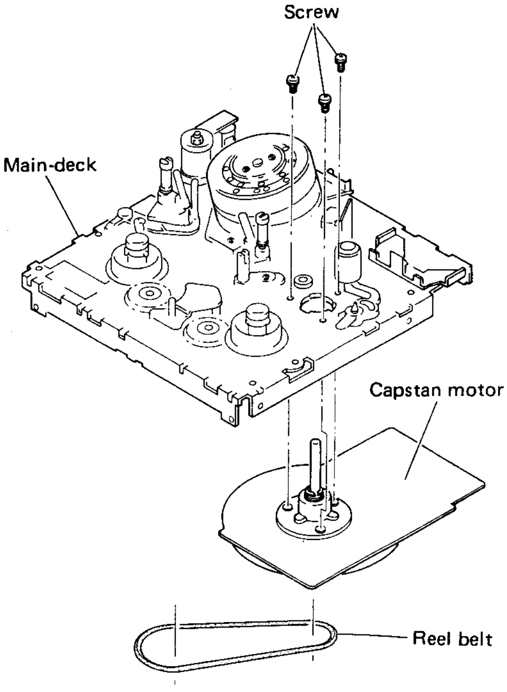

Screw
Main-deck
Capstan motor
Reel belt

Fig. 2-10 Capstan motor replacement

2.3.6 **Mode Control Motor** (See Figure 2-11.)

1. Disconnect connector CN10 from the MECHACON board.
2. Take out three screws to remove the motor with bracket.
3. Replace the motor bracket and reassemble by reversing the above steps.

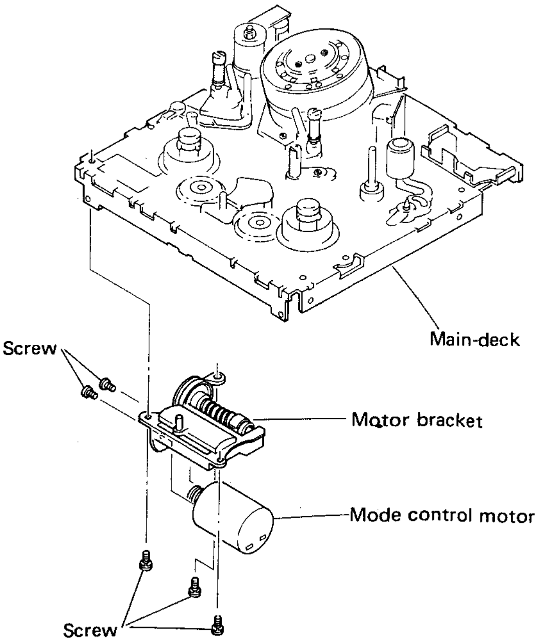

Main-deck
Screw
Motor bracket
Mode control motor
Screw

Fig. 2-11 Mode control motor replacement

When replacing only the mode control motor, perform the following steps.

4. After removing the motor bracket, unsolder two wires and a capacitor from the mode control motor.
5. Disengage a belt from the motor pulley, take out two screws and remove the mode control motor.
6. Replace the mode control motor and reassemble by reversing the above steps. Use care regarding the motor wire polarity (refer to Table 2-5).

Motor Polarity	Wire Color
+	Red
–	Brawn

Table 2-5 Motor wiring

2.3.7 **Reel Disks** (See Figure 2-12.)

- Supply reel disk

1. Disengage the tension band from the tension pole and move it to the side. Use care regarding the FF brake when moving the tension band.
2. Take out the slit washer, move the FF brake and remove the supply reel disk by lifting it upwards. Use care regarding the washer under the reel disk.
3. After cleaning the reel shaft with alcohol, lubricate it with sewing machine oil. Do not over lubricate.
4. Replace the supply reel disk and reassemble by reversing the above steps.
5. Perform the back tension check (refer to section 2.4.4).

- Take-up reel disk

1. Disengage the spring and remove the search brake by lifting it upwards.
2. Take out the slit washer, move the REW brake and remove the take-up reel disk by lifting it upwards. Use care regarding the washer under the reel disk.
3. After cleaning the reel shaft with alcohol, lubricate with sewing machine oil. Do not over lubricate.
4. Replace the take-up reel disk and reassemble by reversing the above steps.

2.3.8 **Clutches** (See Figure 2-13.)

- Take-up clutch

1. Remove the take-up reel disk (refer to section 2.3.7).
2. Take out the slit washer and remove the take-up clutch by lifting it upwards. Use care regarding the washer under the clutch.
3. Replace the take-up clutch and reassemble by reversing the above steps.
4. Perform the take-up torque check (refer to section 2.4.3).

- Supply clutch

1. Remove the supply reel disk (refer to section 2.3.7).
2. Take out the slit washer and remove the supply clutch by lifting it upwards. Use care regarding the washer under the clutch.
3. Replace the supply clutch and reassemble by reversing the above steps.

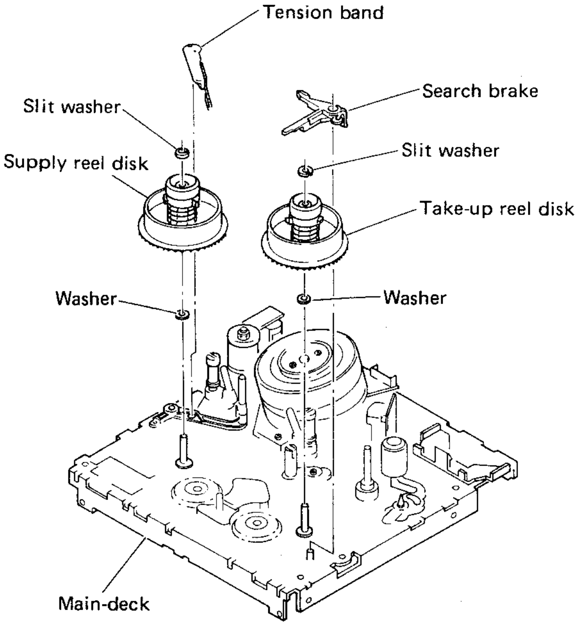


Fig. 2-12 Supply and Take-up reel disk replacement

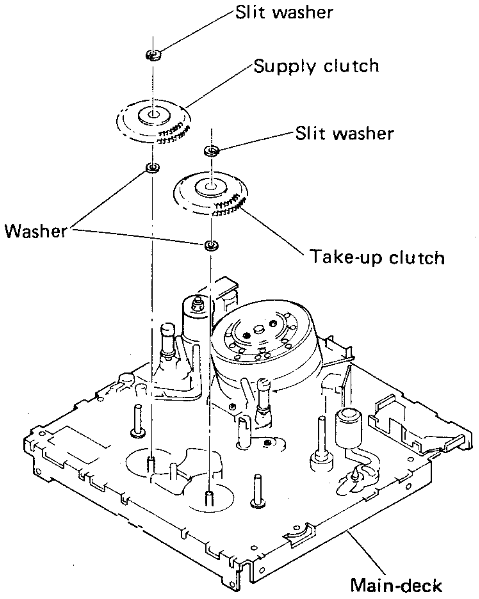


Fig. 2-13 Take-up and Supply clutch replacement

2.3.9 **Brush** (See Figure 2-14.)

1. Take out the screw and remove the brush, and clean the commutator with alcohol.
2. Replace and install the brush as before, check that the brush contacts the center of the commutator.

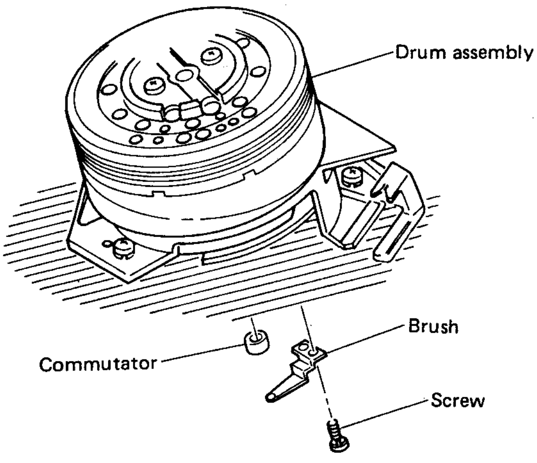


Fig. 2-14 Brush replacement

2.3.10 **Tension Band** (See Figure 2-15.)

1. Take out the screw and disengage the tension band from the tension pole.
2. Move the FF brake and remove the tension band.
3. Replace and install the tension band as before.
4. Perform the tension pole position check and the back tension check (refer to sections 2.4.2 and 2.4.4).

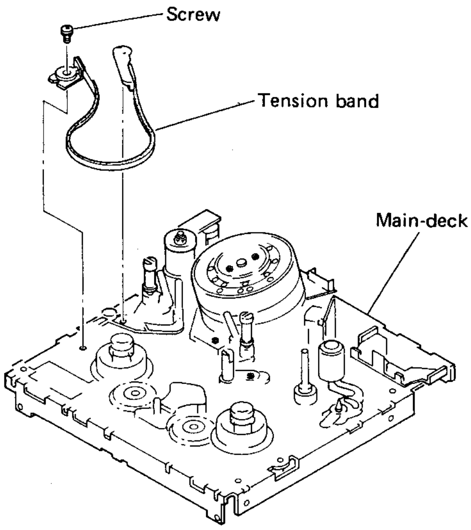


Fig. 2-15 Tension band replacement

2.3.11 **Pick-up Head** (See Figure 2-16.)

1. Disconnect connector CN5 from the SERVO board.
2. Take out the screw and remove the pick-up head.
3. Replace the pick-up head and reassemble by reversing the above steps, check that the pick-up head is toward the center portion of the drum shaft.
4. Perform the drum pulse level adjustment and PB/REC switching point adjustments. Refer to sections 3.5.4, 3.5.5, and 3.5.1.

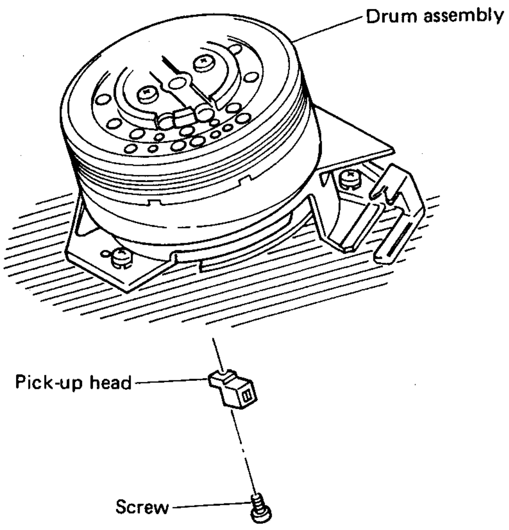


Fig. 2-16 Pick-up head replacement

2.4 CHECKS AND ADJUSTMENTS

2.4.1 Loading System Timing Check

1. When the STOP arrow mark of the control cam is aligned with the center of the loading gear, confirm that the boss of the loading gear (1) corresponds with hole A of the supply loading ring.
2. At the same time, confirm that the two holes of the supply and take-up loading rings are aligned through the hole of the main-deck (arrow B in figure 2-17).
3. If a discrepancy is noted, after removing the control cam, remove and reinstall the loading gears and connect gear (2) to obtain the correct position.
4. In order to remove and install the control cam, put suitable tools (hex key wrench, screw driver etc.) through the holes (arrow B and arrow C in figure 2-17).
5. When install the control cam, move the rod (1) fully to the arrow direction in figure 2-17, then mount the control cam with the mode sensor assembly in the state that the biggest arrow mark on the control cam is aligned with the center of the loading gears.
   In this state, the cassette housing pops up.

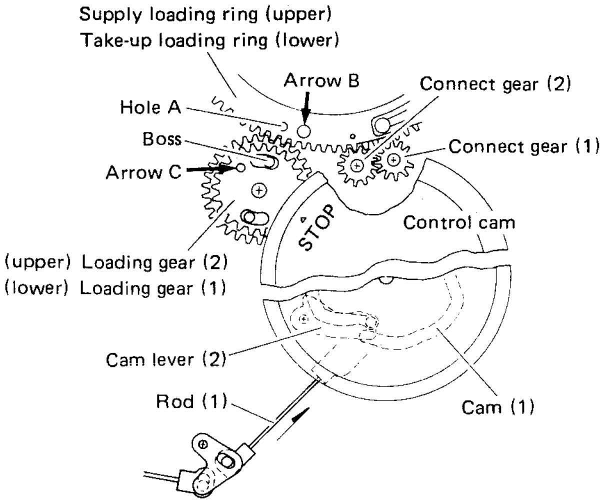


Fig. 2-17 Loading system timing check

2.4.2 Tension Pole Position Check

1. Without loading a tape, set for the PLAY mode.

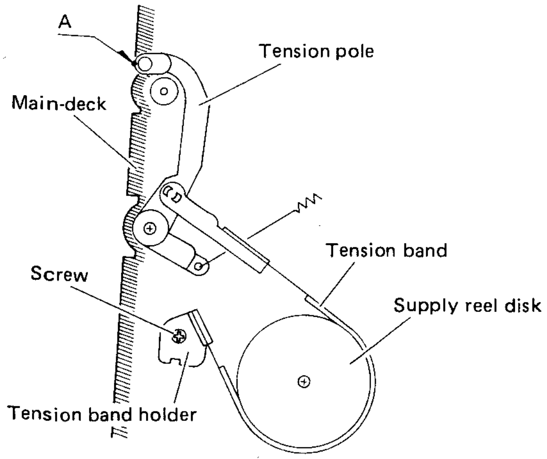


Fig. 2-18 Tension pole position check

2. Confirm that the left edge of the tension pole (section A in figure 2-19) lies upon the side edge of the main-deck.
3. If necessary, loosen the screw and adjust the tension band holder to obtain the correct tension pole position.

2.4.3 Take-up Torque Check

1. Set the PLAY mode without the cassette houding.
2. Set the torque gauge on the take-up reel disk.
3. Relax the grip on the torque gauge so that the indicator needle and scale rotate at an equal speed, then read the indication. The correct value is between 60 and 100.
4. If not the correct value, install a new take-up clutch. In addition to replacing the supply clutch should also be replaced. Refer to section 2.3.8.

2.4.4 Back Tension Check

1. Use the back tension cassette gauge and set for the PLAY mode.
2. Confirm that the indication is between 14 and 22.
3. If not the correct value, after checking the tension pole position, replace the tension band. If the indication fluctuates greatly, replace the supply reel disk. Refer to sections 2.3.10 and 2.3.7.

2.4.5 Tape Transport System Checks and Adjustments

The tape transport system has been precisely aligned at the factory and normally does not require readjustment. The following check is therefore necessary only in cases of severe usage or when replacing parts affecting the tape transport system.

- Tape transport checks

1. Use a 180-minute tape and check at tape beginning and ending portions according to the following steps.
   1) During PLAY mode, observe tape at the entrance and exit portions of the drum lead (refer to Figures 2-19 and 2-20).
      Confirm that the tape slips neither upward nor downward with respect to the lead.

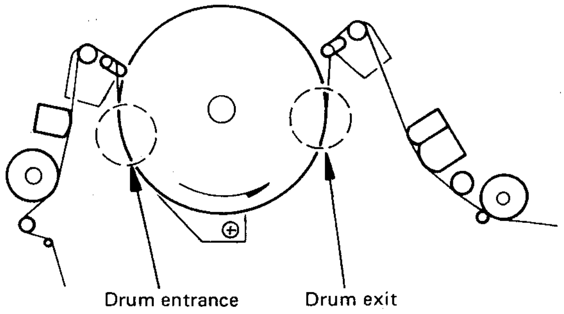


Fig. 2-19 Drum entrance/exit

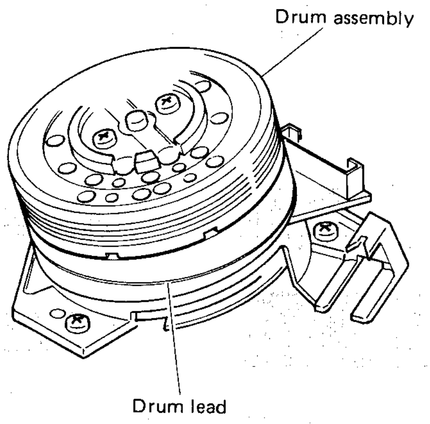
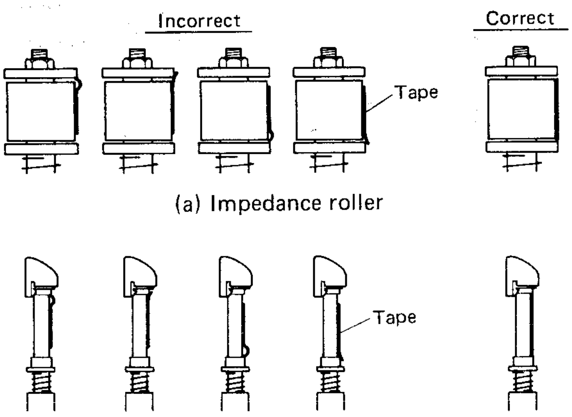


Fig. 2-20 Drum lead

2) If defects are noted during the above check, perform the guide roller height adjustment.
3) During PLAY mode, observe the tape at the take-up guide pole and impedance roller. Confirm absence of curling, wrinkling, etc.



(a) Impedance roller

(b) Take-up guide pole

Fig. 2-21 Impedance roller/guide pole

4) If defects are noted during the above check, perform the impedance roller height and the A/C head inclination adjustments.

2. At the ending portion of the recorded 180-minute tape, set for the PB REV mode.
   1) Confirm absence of curling, wrinkling, slip, etc. at the take-up guide pole.
   2) In the same manner, during Search REV mode, check at the take-up guide pole.
   3) If defects are noted during the above check, perform the reverse tape path adjustment.
3. Perform the interchangeability checks and adjustment (refer to section 2.4.6).

- Guide roller height adjustment

1. Slightly loosen setscrew under the guide roller of the pole base.
2. Use a cassette tape and set for the PLAY mode.
3. With a slotted screwdriver, slightly turn the guide roller so that the tape travels smoothly in the drum lead without slipping upwards or downwards.

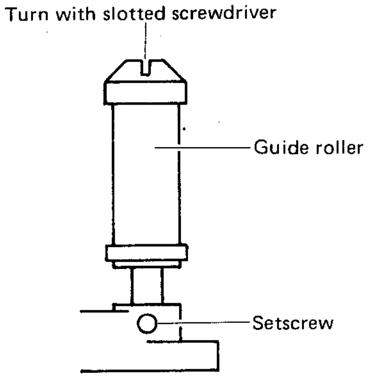


Fig. 2-22 Guide roller height adjustment

Notes:
1) Loosen the setscrew only enough to allow the guide roller to be turned.
   If excessively loose, tape motion may turn the roller inadvertently.
2) Turn the roller carefully to avoid damage to the tape.

- Impedance roller height adjustment

1. Use a cassette tape and set for the PLAY mode.
2. Use a metric nutdriver for turning the nut to align the tape lower edge with the upper face of the lower flange.

- A/C head inclination adjustment

1. Use a cassette tape and set for the PLAY mode.
2. Turn A/C head screw A and align the tape lower edge with the upper face of the lower guide flange.

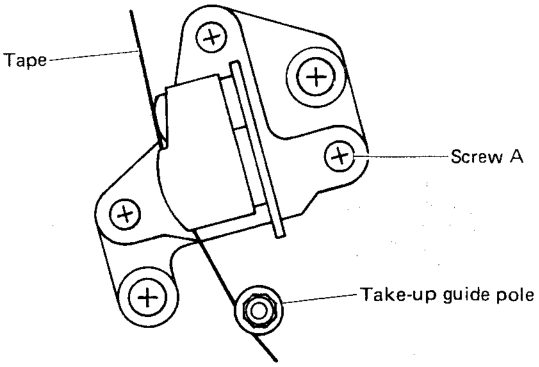


Fig. 2-23 A/C head inclination adjustment

Note: Do not adjust the height of the take-up guide pole itself.

- Reverse tape path adjustment

1. At the ending portion of the recorded 180-minute tape, set for the Search REV mode.
2. Adjust the setscrew of the TU guide for smooth tape transport at the take-up guide pole.

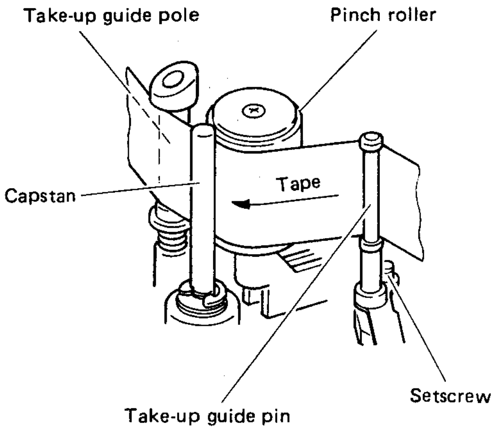


Fig. 2-24 REV tape path adjustment

Note: Two or three seconds may elapse after adjusting the setscrew for the effect to appear at the take-up guide pole.

3. Set for the PB REV mode and confirm absence of curling, wrinkling, etc.
4. If defects are noted, repeat the above steps 1 and 2.

2.4.6 Interchangeability Checks and Adjustments

Before using the alignment tape, use a regular tape and confirm correct tape transport operation.

- FM waveform checks and adjustments

1. Connect an oscilloscope to TP-PB. FM (FM OUT) of the SERVO board. Trigger the oscilloscope externally with the signal from TP-11 (DRUM F.F.) of the SERVO board.
2. Play the stairstep signal of alignment tape MH-2.

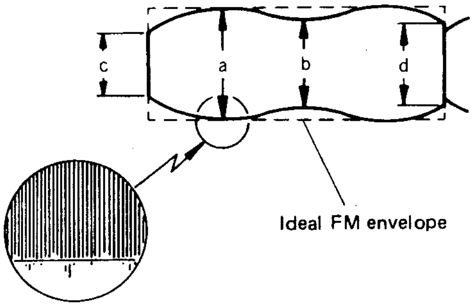


Fig. 2-25 FM waveform (maximum output)

1) Turn the TRACKING knob to obtain the maximum FM output. Refer to Fig. 2-25.
Observe the FM waveform, read the maximum level (a) and the minimum levels (b), (c) and (d).
Confirm that:

$$\frac{b}{a} \geq 0.7,\ \frac{c}{a} \geq 0.5,\ \text{and}\ \frac{d}{a} \geq 0.5$$

Note: If the waveform is serrated, read the value at the most uniform serrations.

2) Turn the TRACKING knob to vary the FM output from maximum to minimum.
Confirm that the waveform variation is nearly parallel.

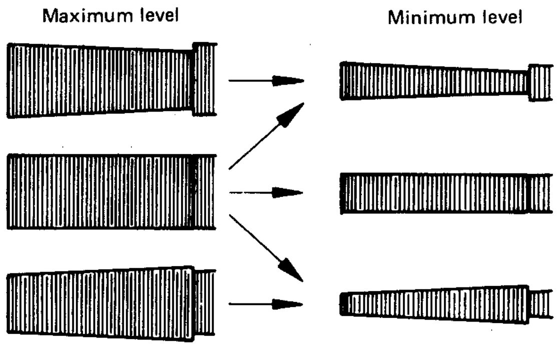


Fig. 2-26 Normal waveform examples

3) If the above checks yiels normal results, proceed to the A/C head adjustments.

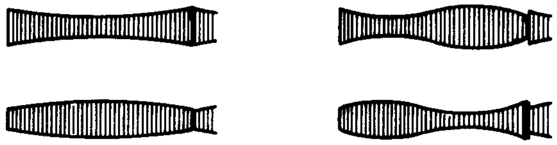


Fig. 2-27 Incorrect waveform examples

4) If defects are noted, perform the following adjustments.

3. Loosen the setscrews of the supply and take-up guide rollers. If the guide rollers turn freely, slightly tighten the setscrews.
4. Play the stairstep signal of alignment tape MH-2.
5. Observe oscilloscope display and adjust the TRACKING knob for maximum FM output.

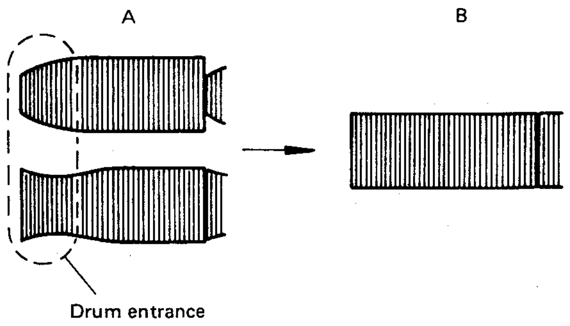


Fig. 2-28 Drum entrance adjustment

1) Refer to Fig. 2-28. Examples of incorrect waveforms are shown by A.
Use a slotted screwdriver to adjust the supply guide roller so that the rising portion (drum entrance) of the waveform becomes flat as shown by B.

2) In the same manner as for the drum entrance, turn the take-up guide roller to adjust the falling portion (drum exit) of the FM waveform. Incorrect examples are shown by C in Fig. 2-29, while D indicates the correct adjustment.

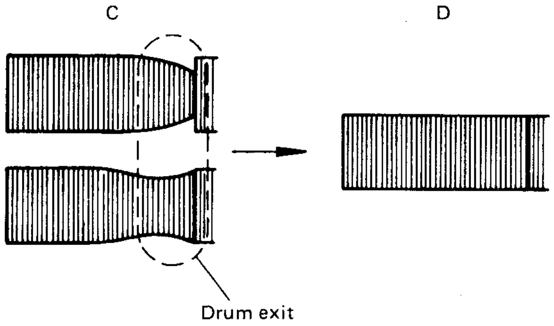


Fig. 2-29 Drum exit adjustment

3) In addition to observing the waveform, confirm absence of tape slippage or curling at the impedance roller and take-up guide pole.
If the tape separates from the guide or wrinkling occurs at the impedance roller, adjust the impedance roller height (refer to section 2.4.5).
If at the take-up guide pole, adjust by turning A/C head screw A (refer to section 2.4.5).

6. Observe the FM waveform and adjust the TRACKING knob for minimum FM output level.
   1) If the waveform becomes similar to A, B, C or D in Fig. 2-30, carefully adjust the supply and take-up guide rollers so that the waveform becomes similar to E, F or G.

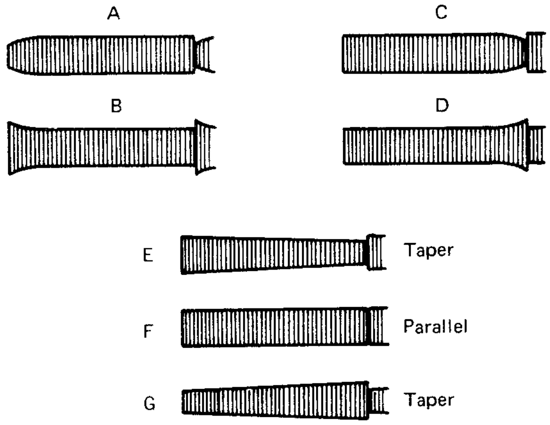


Fig. 2-30 Minimum FM waveform

Note: At this time, if the waveform fluctuates, adjust for minimum fluctuation.

2) Vary the FM output level and perform fine adjustment of the supply and take-up guide rollers.

- A/C head height and azimuth adjustments (See Figure 2-31.)

Incorrect A/C head height can impair audio signal-to-noise ratio when playing back a pre-recorded tape.

1. Connect an oscilloscope to CN2-2 (AUDIO OUT) of the AUDIO board.
2. Play 6 kHz segment (stairstep signal) of the alignment tape MH-2.

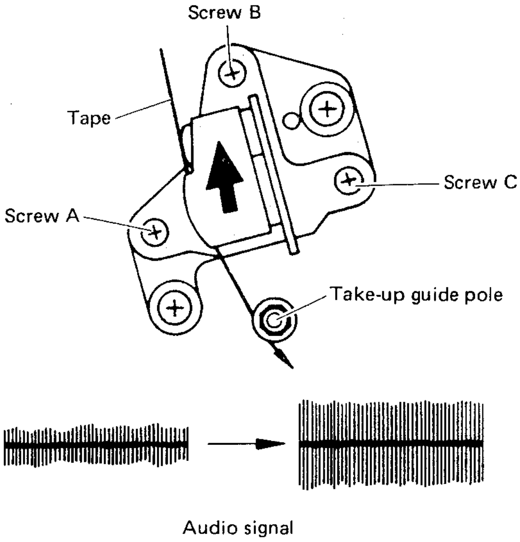


Fig. 2-31 A/C head adjustments

1) Turn screws A, B and C in succession by small and equal increments at a time and adjust for maximum audio output level. With reference to screw A, adjust azimuth with screw B and screw C so that small tape wrinkles are not produced at the guide pole, but at the same time, audio output becomes maximum and level fluctuations minimum.

- Setscrew tightening

1. After confirming absence of tape wrinkling and other transport irregularities, tighten the setscrews in the STOP mode.
   Note: Since the guide rollers are easily moved, use care when tightening.
2. Again perform the FM waveform checks.

- Control head phase adjustment (See Figure 2-32.)

1. Connect an oscilloscope to TP-PB. FM (FM OUT) of the SERVO board. Trigger the oscilloscope externally with the signal from TP-11 (DRUM F.F.) of the SERVO board.
2. Play the stairstep signal of alignment tape MH-2.
3. Set the trigger to ⊖ slope and observe the CH-1 FM waveform.

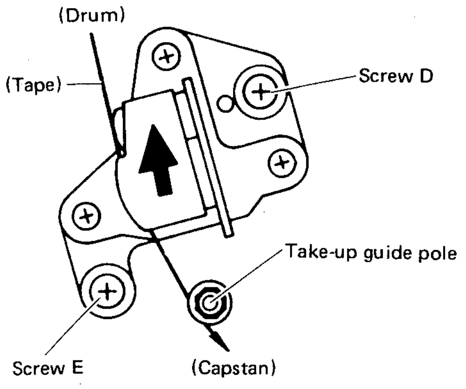


Fig. 2-32 CTL head phase adjustment

- Tracking center adjustment.
  1) Set the TRACKING knob to center detent position (AUTO).
  2) Loosen two screws D and E, and slide the A/C head assembly fully in the direction to the take-up guide pole.
  3) Slightly tighten the two screws, set the A/C head position tool over screw D and insert the pin of the tool into the hole at the side of screw D.
  4) Observe the FM output level and slowly turn the tool to slide the A/C head assembly in the direction of the arrow as shown in Figure 2-32.
  5) Set the A/C head assembly to the position where first maximum FM level is obtained. Tighten two screws D and E.

- Servo circuit adjustment

1. Perform the PB/REC switching point adjustments. Refer to sections 3.5.4 and 3.5.5.

- Final checks

1. Connect an oscilloscope to TP-PB. FM (FM OUT) of the SERVO board. Trigger the oscilloscope externally with the signal from TP-11 (DRUM F.F.) of the SERVO board.
   1) Supply a video signal and perform recording, then playback. Confirm that the FM waveform also satisfies the specifications during palyback of MH-2.
2. Perform overall checks and adjustments of the servo circuit and video circuit.
3. Perform the audio circuit adjustment.

SECTION 3
ELECTRICAL ADJUSTMENTS

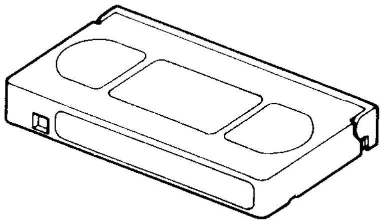
3.1 PREPARATION

Electrical adjustments are required after replacing circuit components and certain mechanical parts.
It is important to perform these adjustments only after all repairs and replacements have been completed. Also, do not attempt these adjustments unless the proper equipment is available.

3.2 REQUIRED TEST EQUIPMENT AND FIXTURES

1. Color television monitor
2. Oscilloscope: (wide-band, dual trace, triggered delayed sweep)
3. Test signal generator: color bar, stairstep
4. Frequency counter
5. Audio tester (combination audio frequency oscillator and meter)
6. Digital voltmeter
7. Recording tape
8. Regulated DC power supply 12 V

9. MH-2



10. Patch Cord PUJ36857

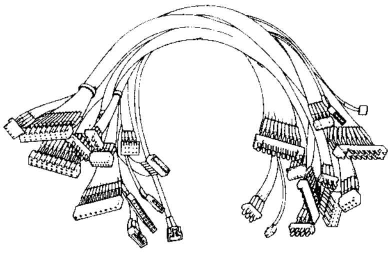
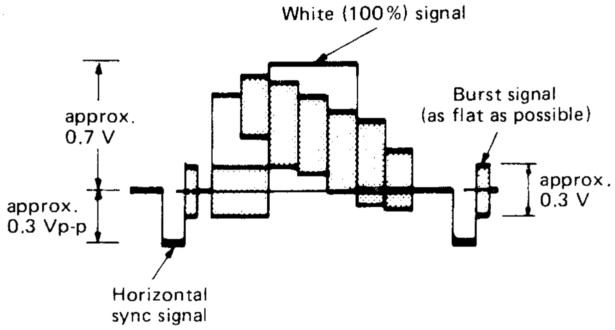


Table 3-1

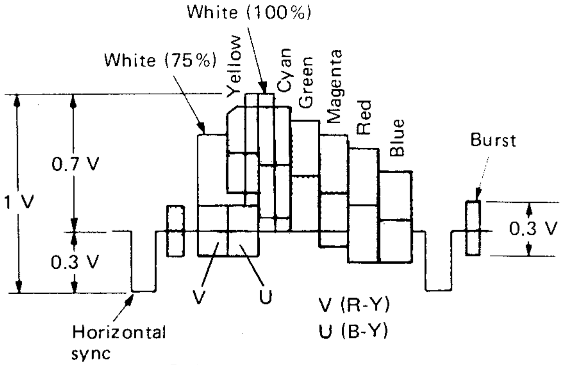
Patch Cord Connection	
Cord Color	Connection
SKY BLUE	MULTI CONNECTOR – $\boxed{0}\boxed{2}$ CN12
GREEN	MULTI CONNECTOR – $\boxed{0}\boxed{2}$ CN11
RED	$\boxed{0}\boxed{3}$ CN3 – A/C HEAD
BLACK	$\boxed{0}\boxed{9}$ CN1 – $\boxed{0}\boxed{2}$ CN7
YELLOW	$\boxed{0}\boxed{6}$ CN1 – $\boxed{0}\boxed{2}$ CN6
WHITE	$\boxed{0}\boxed{3}$ CN6 – $\boxed{0}\boxed{4}$ CN1
PINK	$\boxed{0}\boxed{3}$ CN2 – $\boxed{0}\boxed{2}$ CN9
BROWN	$\boxed{0}\boxed{3}$ CN1 – $\boxed{0}\boxed{2}$ CN8
ORANGE	$\boxed{0}\boxed{1}$ CN4 – $\boxed{0}\boxed{2}$ CN14
BLUE	$\boxed{0}\boxed{1}$ CN3 – $\boxed{0}\boxed{2}$ CN3
VIOLET	$\boxed{0}\boxed{1}$ CN2 – $\boxed{0}\boxed{2}$ CN2
GRAY	$\boxed{0}\boxed{1}$ CN1 – $\boxed{0}\boxed{2}$ CN1

Table 3-2


White (100%) signal
Burst signal (as flat as possible)
approx. 0.7 V
approx. 0.3 V
approx. 0.3 Vp-p
Horizontal sync signal

Color-bar signal of pattern generator

Fig. 3-1


White (100%)
White (75%)
Yellow
Cyan
Green
Magenta
Red
Blue
Burst
0.7 V
1 V
0.3 V
0.3 V
V
U
V (R-Y)
U (B-Y)
Horizontal sync

Color bar signal waveform

(75%) →

White	Yellow	Cyan	Green	Magenta	Red	Blue
V	U	White 100%			Black	

Color bar pattern

Fig. 3-2

3.2.1 Alignment tape contents

1. MH-2 contents

Segment	Playback Time	Video Signal	Audio Signal	Applications
1	10 minutes	Stairsteps	6 kHz	• Interchangeability checks and adjustments • Servo circuit checks and adjustments • Audio head azimuth adjustments
2	5 minutes	(none)	3 kHz	• Tape speed checks • Wow and flutter checks
3	10 minutes	Color bars	1 kHz (0 dB)	• Video signal playback circuit checks and adjustments • Audio signal playback circuit checks and adjustments
4	3 minutes	RF sweep	(none)	• Video head resonance adjustments • Markers: 2.0, 4.0, 5.0 MHz

Table 3-3

3.3 SWITCHING REGULATOR SYSTEM ADJUSTMENTS ($\boxed{0}\boxed{2}$ VIDEO board)

3.3.1 5.25 V DC output voltage

Mode : REC
Digital voltmeter : TP401, TP402
DC Power Supply (12 V) : Battery Terminal

1. Adjust R405 for 5.75 V at TP401.
2. Adjust R408 for 5.25 V at TP402.

3.4 MECHACON SYSTEM ADJUSTMENT ($\boxed{0}\boxed{1}$ MECHACON board)

3.4.1 Battery alarm

Mode : STOP
Digital Voltmeter : TP1, TP2
DC Power Supply : Battery Terminal

1. Adjust R28 so that the Battery Alarm indicator appears on the counter display at 11.0 V (TP1).
2. Set the voltage of TP1 11.0 V.
3. Adjust R28 to the rising point the voltage of TP2 (IC3-8) becomes "H".

3.5 SERVO SYSTEM ADJUSTMENTS

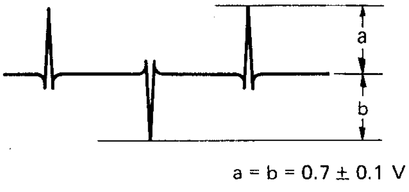
(0 3 SERVO board)

3.5.1 Drum pulse level

Mode : REC
Signal : Color bar
Oscilloscope : TP6

Note: Drum Servo must be locked.

1. Adjust R97 so that the positive and negative pulse become 0.7 ± 0.1 Vp-p.



DRUM PULSE

Fig. 3-3

3.5.2 Capstan DISCR. position

Mode : REC
Signal : Color bar
Oscilloscope : TP3

1. Short TP22 to TP-GND.
2. Adjust R15 to stabilize the sampling pulse with respect to the trapezoid. All this time, a slow drift at the rate of less than 40 msec in 5 second is acceptable.

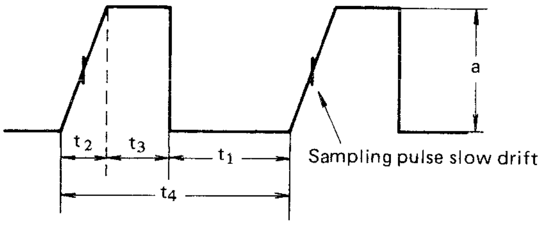


Fig. 3-4

3. Conform following items.

$a \geq 5.0$ V
$t_2 = 3.2 \pm 0.5$ msec
$t_1/t_3 = 1$
$t_4 = 40$ msec

3.5.3 Drum DISCR. position

Mode : REC
Signal : Color bar
Oscilloscope : TP7

1. Short TP21 to TP-GND.
2. Adjust R69 to stabilize the sampling pulse with respect to the trapezoid.
3. Conform following items.

$a > 5.0$ V $t_2/t_1 = 1$
$t_2 = 3.2 \pm 0.5$ msec $t_3 = 40$ msec

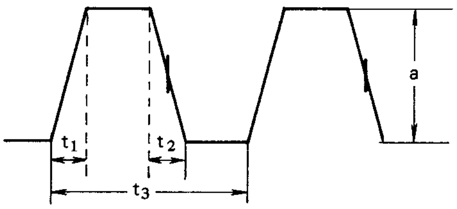
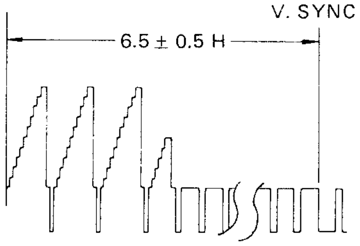


Fig. 3-5

3.5.4 PB switching point

Mode : PB
Signal : Alignment tape (MH-2 Stairsteps)
Oscilloscope : VIDEO OUT

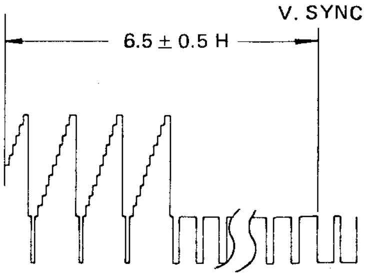
1. Trigger the oscilloscope externally (– slope) with the signal from TP11.
2. Adjust R95 to position the trigger point 6.5 ± 0.5 H before V. sync.



SWITCHING POINT (CH-1)

Fig. 3-6

3. Set the trigger slope of the oscilloscope to plus (+).
4. Adjust R93 to position the trigger point 6.5 ± 0.5 H before V. sync.



SWITCHING POINT (CH-2)

Fig. 3-7

3.5.5 REC switching point

Mode : REC
Signal : Stairsteps
Oscilloscope : VIDEO OUT

1. Trigger the oscilloscope externally (+ slope) with the signal from TP11.
2. Adjust R47 to position the trigger point 6.5 ± 0.5 H before V. sync.

3.5.6 Tracking preset

Mode : SELF REC. after P/B mode
Signal : Stairesteps

1. Preset tracking VR (R36) center crick position.
2. Try several time recording and playback, wach the playback pictre at the switching area point.
3. Adjust the R38 toget vertical line strait as possible.

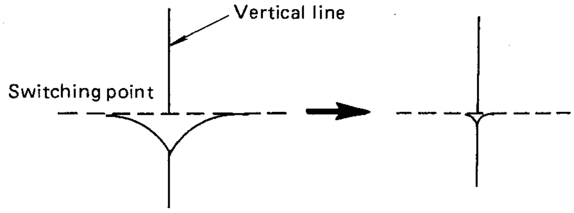


Fig. 3-8

4. After adjustment check the SW PHASE adjustment.

3.5.7 CTL Head position

Refer to mechanical adjustment 2.4.6.

3.5.8 Reverse PB Tracking preset

Mode : REC then Rev. PB
Signal : Color bar

1. Set the tracking control to the center detent position.
2. Adjust R28 to set the noise bar at the bottom of TV screen, but avoiding H. sync disturbance at the top of the picture.

3.5.9 H. discriminator

Mode : Search FF/REW
Signal : Alignment tape (MH-2 Color bar)

1. Adjust R59 to minimize the hue deviation on the TV monitor during SEARCH FF and SEARCH REW mode.

3.5.10 V. pulse

Mode : REC then Still
Signal : Color bar
Oscilloscope : VIDEO OUT

1. Trigger the oscilloscope externally with the signal from TP11.
2. Adjust R101 so that t2 becomes 100 ± 20 μsec.
3. Adjust R103 so that t3 becomes 250 ± 50 μsec.

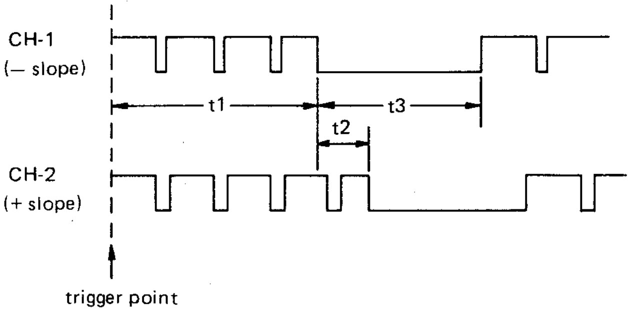


Fig. 3-9

Note: If customer's TV set is available, observe display on screen and adjuat R101 (hole located at rear of the unit) to minimize vertical jitter.

3.6 VIDEO SYSTEM ADJUSTMENTS

([0][2] VIDEO board)

3.6.1 Video head resonance & Q adjustment

This adjustment is required only after replacing the upper drum (video heads). There are two adjusting methods. Useing a MH-2 aliginment tape is much convenient than useing a sweeper generator. So that this manual shows bouth methods.

A: Sweep generators

1. Set for the playback mode without tape. Hook up oscilloscope to pin 8 of IC3 (video board).
2. Connect a sweep generator to TP1, TP2.
3. Adjust C13, C14 for 5.0 MHz peaking.
4. Adjust R1, R2 to get the ratio between 1 MHz and 5.0 MHz level 1 : 2.5 as shown in Fig. 3-10.

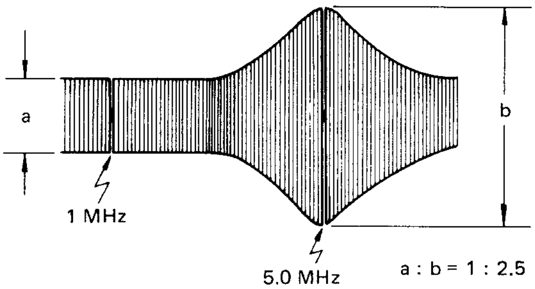


Fig. 3-10

B: Alignment tape method

1. Load the MH-2 alignment tape and playback RF sweep section.
2. Set the oscilloscope to pin 8 of IC3 (video board).
3. Adjust C13, C14 to get the resonance point 5.0 MHz (marker) as shown Fig. 3-11.
4. If the level of CH1 and CH2 differ, adjust the higher level channel to match the lower by setting R1 and R2.
5. Record a video signal; then playback and confirm absence of flicker, black-white reversal in the playback picture. If necessary, adjust R1 and R2 carefully.

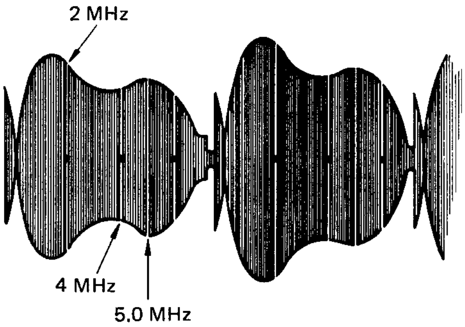


Fig. 3-11

3.6.2 Video E-E level

Mode : E-E
Signal : Color bar
Oscilloscope : VIDEO OUT

1. With load at 75 Ω adjust R80 for 0.92 ± 0.03 Vp-p.

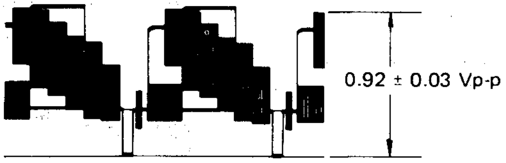


Fig. 3-12

3.6.3 Carrier and deviation

IMPORTANT:

Ordinarily avoid performing this adjustment. It should be performed only if (IC7 of the VIDEO board has been replaced or if significant waveform distortion and S/N deterioration occur during recording and playback due to improper adjustment of the carrier set and deviation.

Note: Before adjustment, turn R140 (DARK CLIP) fully counterclockwise and R152 (WHITE CLIP) fully clockwise so that the signal is not limited.

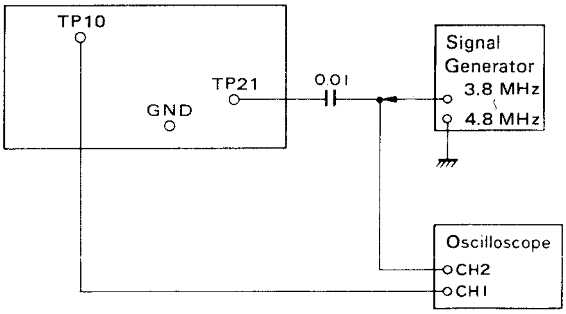


Fig. 3-13

Mode : E-E
Signal : Color bar
Input Select SW : AUX

1. Connect the equipment as shown above figure.
2. Set the oscilloscope to ADD mode and adjust the vertical gain of the oscilloscope and signal generator output to easily observe beat.
3. Set the signal generator for 3.8 MHz and adjust R111 (CARRIER) to set the carrier as shown Fig. 3-14.

4. Set the signal generator for 4.8 MHz and adjust R110 (DEVIATION) to set the deviation as shown in Fig. 3-14.

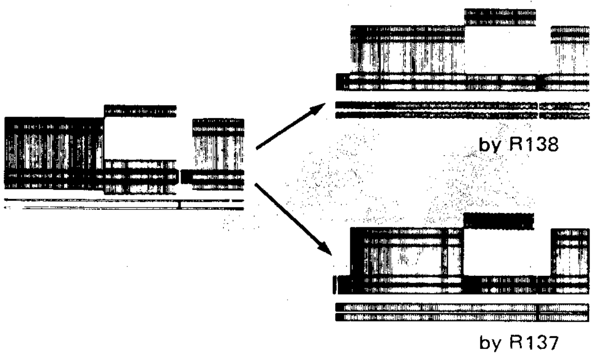


Fig. 3-14

3.6.4 White clip and dark clip

Mode : E-E
Signal : Color bar
Oscilloscope : TP3
Input Select SW : AUX

1. With the rated signal level taken as 100%, adjust R84 (WHITE CLIP) so that the white peak overshoot becomes 90%.
2. In the same condition, adjust R113 (DARK CLIP) so that the sync tip undershoot becomes 45% as shown below.

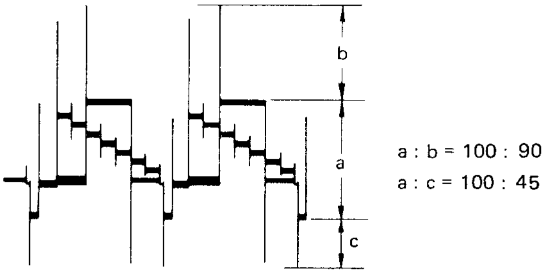


Fig. 3-15

3.6.5 AFC

Mode : E-E
Signal : Color bar
Frequency Counter : TP212

1. Connect fixture (below) between TP203 and TP221.
2. Adjust R222 to obtain 625 kHz ± 5 kHz.

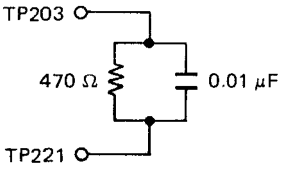


Fig. 3-16

3.6.6 VXO (Variable Crystal Oscillator)

Mode : PB
Signal : Alignment tape (MH-2 Color bar)
Frequency Counter : TP225

1. Adjust R220 to obtain 4.433619 MHz ± 50 Hz.

3.6.7 REC FM level

Mode : REC
Signal : Color bar
Oscilloscope : TP4

1. Adjust R86 so that the level of the FM waveform becomes 3.5 Vp-p.

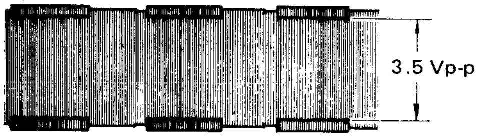


Fig. 3-17

3.6.8 REC Color level

Mode : PB
REC then PB
Signal : Alignment tape (MH-2, color bar)
Oscilloscope : TP204
Input Select SW : AUX

1 load the alignment tape MH-2, playback a color bar segment of the MH-2 and observe color signal level.
2. Trigger the oscilloscope externally (– slope) with the signal from TP11 of the Servo board. During recording, using a regular tape, adjust R201 so that the playback level beocmes 110% as the alignment tape playback.

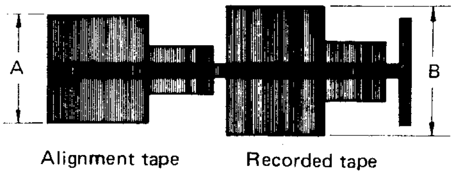


Fig. 3-18

3.6.9 Converter balance

Mode : REC then PB
Signal : Color bar
Oscilloscope : TP201
Input Select SW : AUX
Trigger of Oscilloscope : TP11 (Servo board)

1. Adjust R239 for minimum leakage of the 5.06 MHz component as shown below.

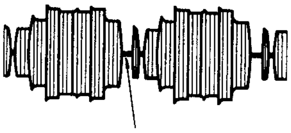


Fig. 3-19

3.6.10 Noise cancel balance

Mode : REC then PB
Signal : Stairsteps
Oscilloscope : TP21

1. Adjust R18 for the flat waveform as shown below.

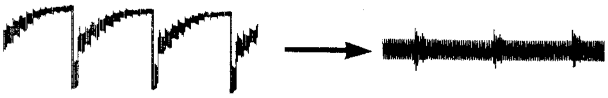


Fig. 3-20

3.6.11 PB Y, burst level

Mode : REC then PB
Signal : Color bar
Oscilloscope : VIDEO OUT or TP10
Input Select SW : AUX

1. With 75Ω load at VIDEO OUT and adjust R14 for a luminance signal level of 0.92 ± 0.05 Vp-p.
2. Adjust R243 for a burst level of 0.27 ± 0.05 Vp-p as shown below.

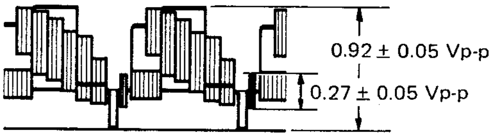


Fig. 3-21

3.6.12 SECAM DET. adjust (only EG type)

Mode : E-E
Signal : SECAM color bar
Oscilloscope : TP223
Input Select SW : AUX

1. Connect oscilloscope TP223. Adjust R257 to get 8.0 Vp-p.
2. Adjust L213 transformer to get waveform following Fig. 3-22.

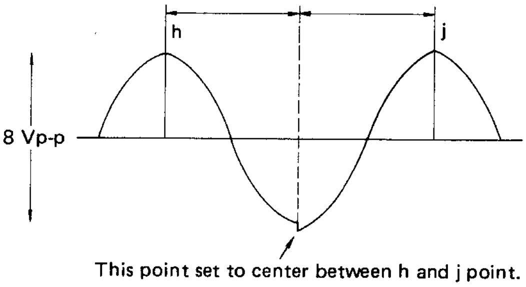


Fig. 3-22

3.7 AUDIO SYSTEM ADJUSTMENT

($\boxed{0}\boxed{7}$ AUDIO board).

3.7.1 Audio PB level

Mode : PB
Signal : Alignment tape (MH-2 1 kHz)
Oscilloscope : AUDIO OUT

1. Adjust R12 for 0 dB (2.2 Vp-p).

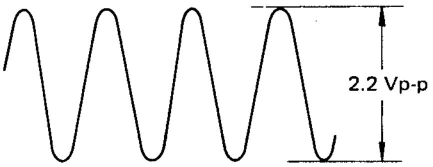


Fig. 3-23

3.7.2 Audio bias level

Mode : REC
Signal : No signal
Digital Voltmeter : Both sides of R1 of the A/C HEAD board (CN1-1, 2)

1. Adjust R31 for 4.4 ± 0.2 mV.

3.7.3 Audio REC level

Mode : REC then PB
Signal : 1 kHz, −10 dBs, VIDEO : Color bar
Oscilloscope : AUDIO OUT
Input Select SW : AUX

1. During recording, adjust R17 to obtain 0 dB (2.2 Vp-p).

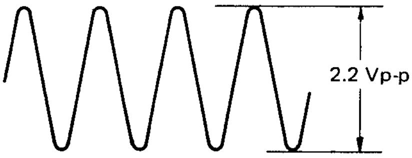


Fig. 3-24

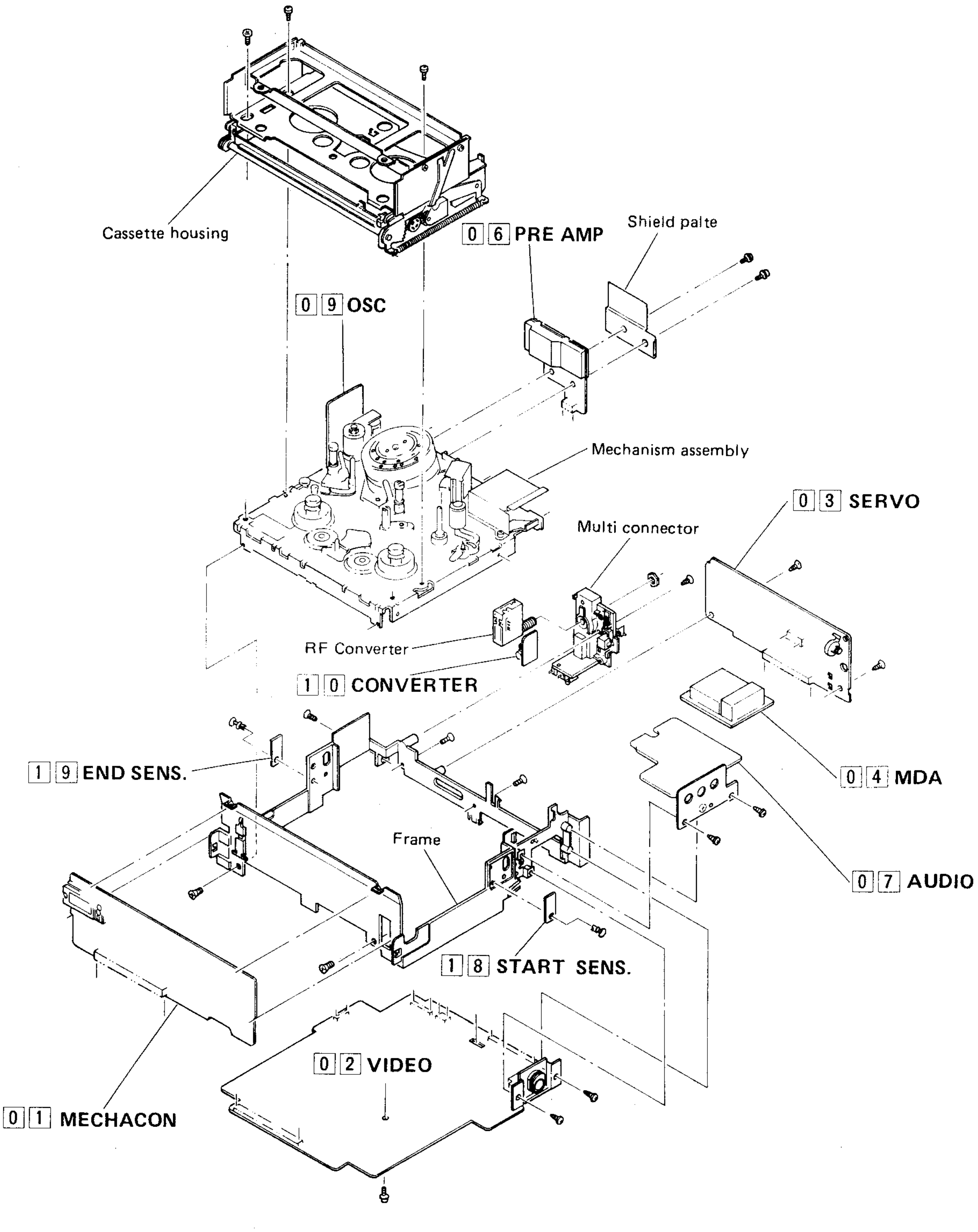
3.7.4 Audio REC/PB frequency response

Mode : REC then PB
Signal : 1 kHz, 10 kHz, 100 Hz, −18 dBs
VIDEO : Color bar
Oscilloscope : AUDIO OUT
Input Select SW : AUX

1. During recording, adjust R31 so that during playback, the 10 kHz level becomes ± 3 dB, the 100 Hz level becomes $\pm{}^{3}_{6}$ dB, with reference to 1 kHz.

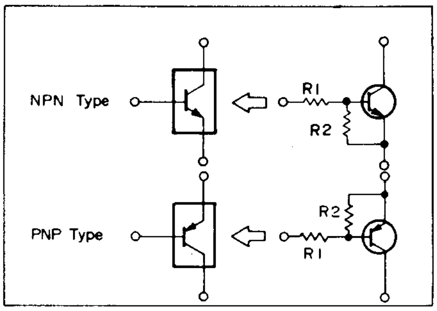
SECTION 4
CHARTS AND DIAGRAMS

4.1 CIRCUIT BOARD LOCATIONS


Cassette housing
06 PRE AMP
Shield palte
09 OSC
Mechanism assembly
03 SERVO
Multi connector
RF Converter
10 CONVERTER
19 END SENS.
04 MDA
Frame
07 AUDIO
18 START SENS.
02 VIDEO
01 MECHACON

4.2 DIGITAL TRANSISTOR, IC & TRANSISTOR PACKAGE VIEWS

DIGITAL TRANSISTOR



RESISTOR VALUES

JUNCTION	Part NO.	R1 (KΩ)	R2 (KΩ)
PNP	DTA114	10	10
	DTA124	22	22
	DTA144	47	47
	DTA144WF	47	22
	DTA114Y	10	47
	DTA114T	10	OPEN
	2SA1345	47	47
	2SA1346	22	22
NPN	DTC114	10	10
	DTC124	22	22
	DTC144	47	47
	DTC144WT	47	22
	DTC114Y	10	47
	DTC143T	4.7	OPEN
	2SC3399	47	47
	2SC3400	22	22

Note: The digital transistor includes built in resistors.
It features small size and high reliability.
Both PNP and NPN types are available.

USES: INVERTER, INTERFACE, DRIVER CIRCUITS.

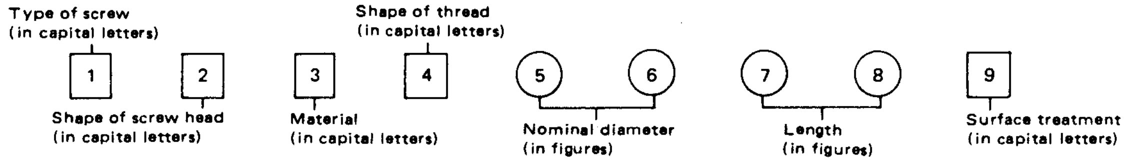
SECTION 5
EXPLODED VIEWS AND PARTS LIST

SAFETY PRECAUTION

Parts identified by the ⚠ symbol are critical for safety. Replace only with apecified part numbers.

5.1 STANDARD PART NUMBER CODING (Screw coding)

Standard screw part numbers are as follows.



Type of screw (in capital letters)
Shape of thread (in capital letters)
1
2
3
4
5
6
7
8
9
Shape of screw head (in capital letters)
Material (in capital letters)
Nominal diameter (in figures)
Length (in figures)
Surface treatment (in capital letters)

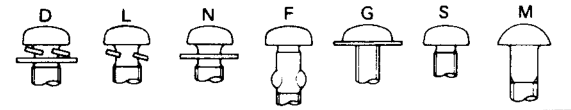
Type of screw (first digit)

S	Normal screws
D	Assembled machine screws (with plain and spring washers)
L	″ (with spring washer)
N	″ (with plain washer)
F	Feather screws
G	Washer head tapping screws
M	Wood screws

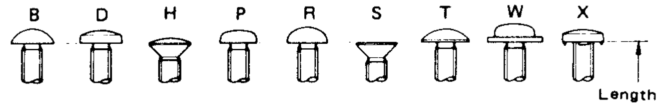
Shape of screw head (second digit)

B	Brazier head
D	Binding head
H	Oval countersunk head
P	Pan head
R	Round head
S	Flat head
T	Truss head
W	Washer head (machine screws)
X	Toothed head

–Type of screw (first digit) –



– Shape of screw head (second digit) –



B
D
H
P
R
S
T
W
X
Length

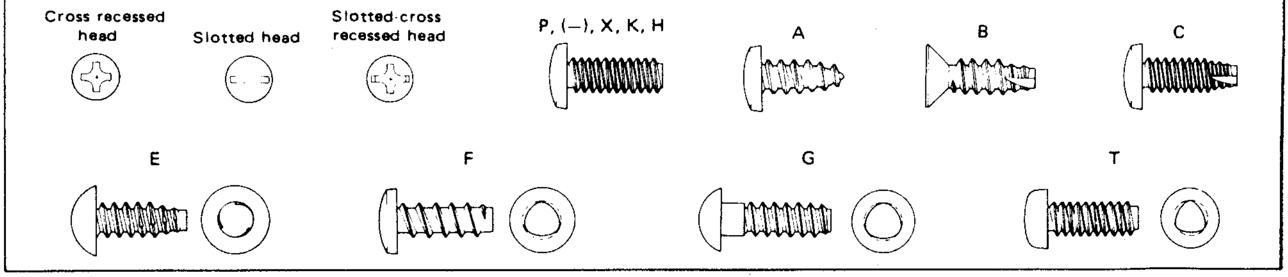
Material (third digit)

S	Steel
E	Stainless steel
C	Cast iron
U	Copper
B	Brass
P	Phosphor bronze
N	Nickel silver
Y	Cast brass
A	Aluminum
Z	Zinc alloy
K	Polycarbonate

Shape of thread (fourth digit)

P	Cross recessed head screws
(–)	Slotted head machine screws
X	Slotted-cross recessed head machine screws
K	Cross recessed head machine screws for precision equipment (type 1)
H	″ (type 3)
A	Cross recessed head tapping screws (type 1)
B	″ (type 2)
C	″ (type 3)
E	Cross recessed head special tapping screws (brand : evertight)
F	″ (brand : P-tight)
T	″ (brand : taptight)
G	″

– Shape of thread (fourth digit) –



Cross recessed head
Slotted head
Slotted-cross recessed head
P, (–), X, K, H
A
B
C
E
F
G
T

Nominal diameter (fifth and sixth digits)

The fifth and sixth digits are numbers indicating a nominal diameter or dimension. If the dimension exceeds 10 mm, three digits are used. The number indicates a nominal diameter or dimension, given in millimeters, multiplied by ten.

Length (seventh and eighth digits)

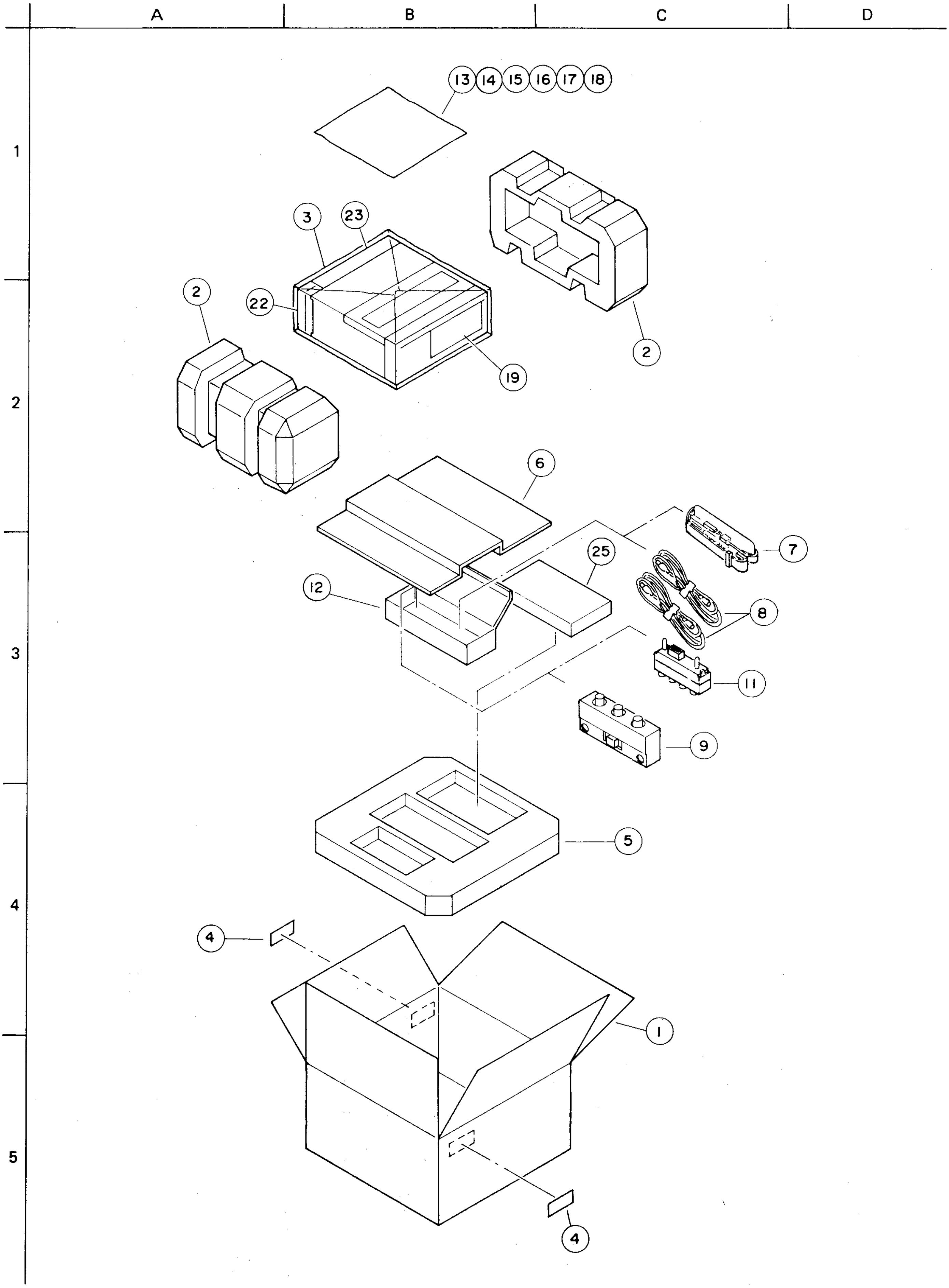
The seventh and eighth digits are numbers indicating length in milimeters. The preceding figure is zero when the dimension is smaller than 10 mm. For machine screws used in precision equipment whose length is given in units of 0.1 mm, the number indicates ten times the size of their length.

Surface treatment (ninth digit)

Z	Dichromate treatment after galvanizing (MFZn II-C)
N	Nickel plating (MFNi II, MFNi I)
R	Chromium plating (MBCr II, MBCr I)
G	Silver plating (SP4)
B	Black coating after plating
F	Blackening of iron (FB)
M	Blackening after galvanizing
K	Pickling of brass (PF2)
P	Phosphate treatment
W	Uni-chrome plating
L	Coating with transparent paint
A	Coloring red after galvanizing (MFZn II-C)
C	Coloring blue after galvanizing (MFZn II-C)
T	Coloring green after galvanizing (MFZn II-C)
V	Coloring purple after galvanizing (MFZn II-C)

5.2 EXPLODED VIEWS AND PARTS LIST

5.2.1 Packing assembly



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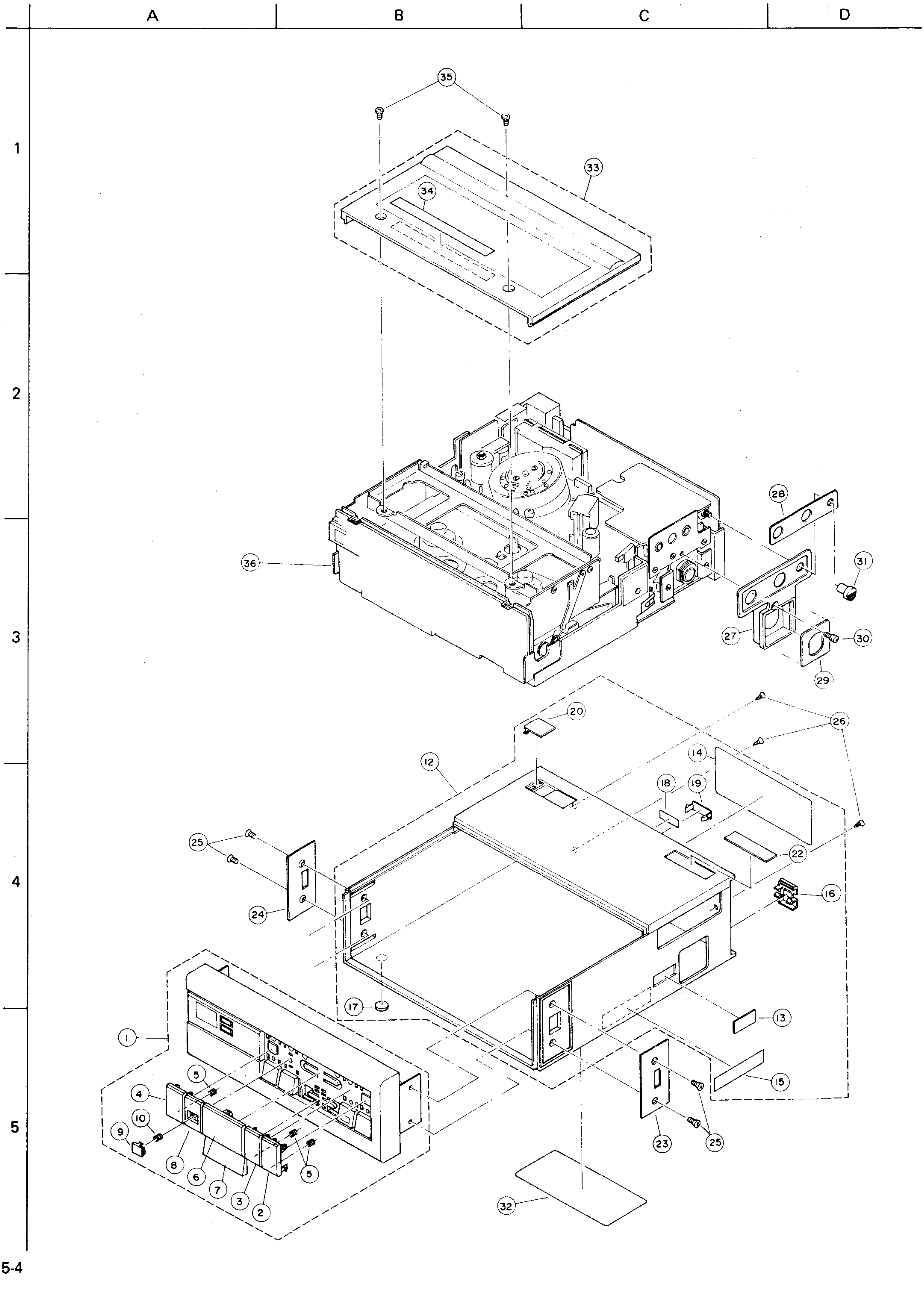
4

– Packing assembly list –

Symbol No.	Part No.	Part Name	Description	Symbol No. Position	Q'ty
1	PQ30257-5	Packing Case	EG	4-C	1
	" -7	"	EK	4-C	1
2	PQ30258A	Cushion Ass'y		2-A, 2-C	1
3	PQM30021-42	Poly Bag	EG	1-B	1
	PUP30320-21	"	EK	1-B	1
4	PUP40329	Serial No. Sticker		4-A	2
5	PQ30316	Cushion		4-C, 5-C	1
6	PQ30317	Sheet		2-C	1
7	PU56610-2	Shoulder Belt		3-D	1
⚠ 8	PU55906	AERIAL Cable Ass'y		3-C	2
9	PU53593-3	Antenna Select Box	EK	3-C	1
	" -8	"	EG	3-C	1
10	–	–		–	–
11	PU56881-5	Dubbing Connector	EK	3-C	1
	" -4	"	EG	3-C	1
12	PQ41014	Case		3-B	1
⚠ 13	PU30425-686	Instruction Book	EG	1-B	1
⚠	" -688	"	EK	1-B	1
14	PQM30023-5	Poly Bag	EK	–	–
15	QPGA025-03505	"	EG	1-B	1
16	BT-20069-A	Warranty Card	EG	1-C	1
17	BT-20066	Guaranty Card	EK	1-C	1
18	BT-20060	"	EK	1-C	1
19	–	Cabinet Ass'y	See Section 5.2.3.	2-B	1
20	–	–		–	–
21	–	–		–	–
22	PU57109-2	Connector Cover		2-A	1
23	PU21935B	Dummy Battery		1-B	1
24	–	–		–	–
25	PTE-30	Cassette Tape		3-C	1

5.2.2 Cabinet assembly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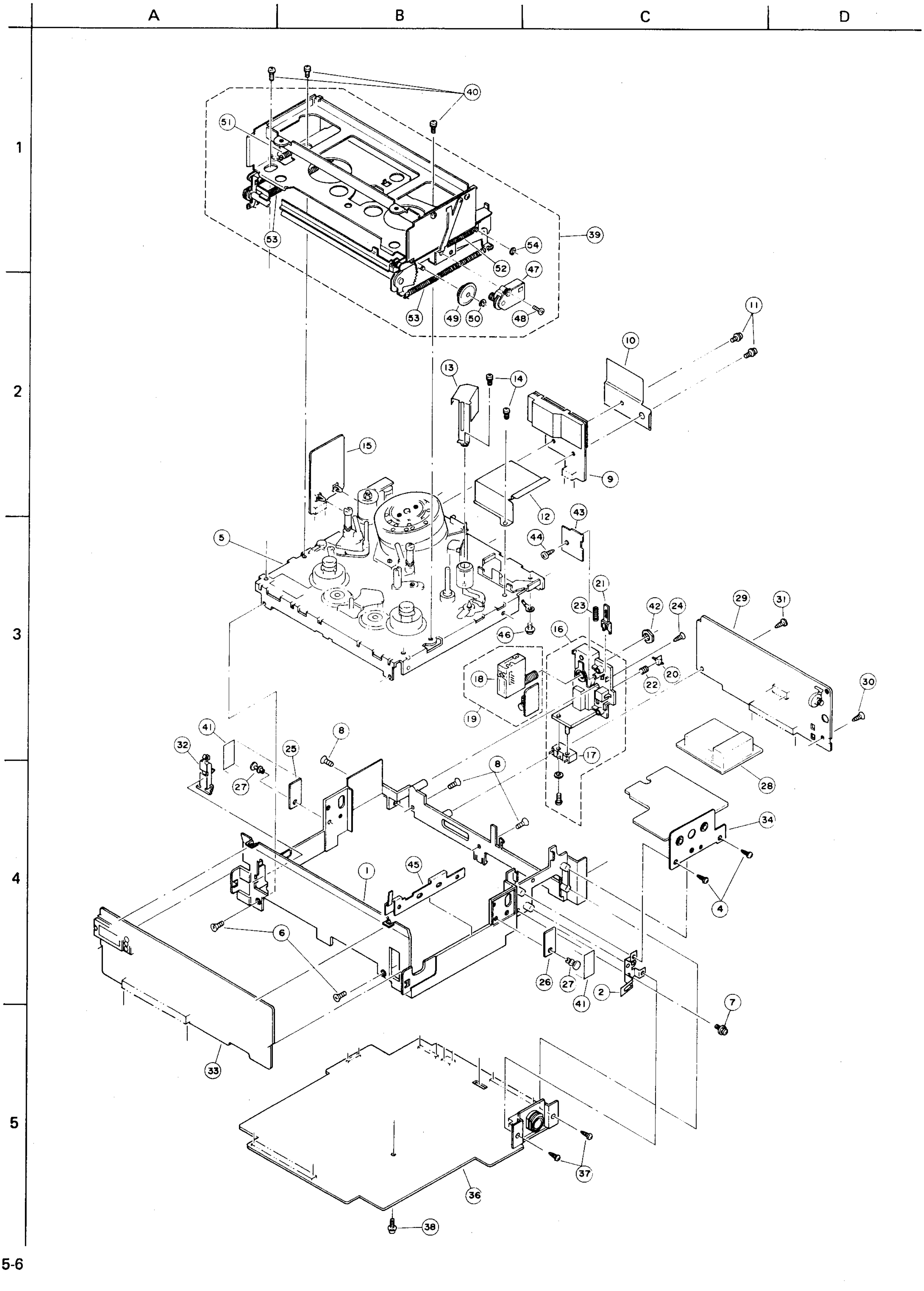
32

– Cabinet assembly list –

Symbol No.	Part No.	Part Name	Description	Symbol No. Position	Q'ty
⚠ 1	PQ10062H-6	Front Cover Ass'y	EG Incl. ② – ⑩	5-A	1
⚠	PQ10062K-6	″	EK Incl. ″	5-A	1
⚠ 2	PQ30248-4-4	Operation Button	EJECT EK	5-A	1
⚠	″ -7-4	″	″ EG	5-A	1
3	″ -5-4	″	STOP	5-A	1
4	″ -6-4	″	PAUSE	5-A	1
5	PQM30002-115	C. Spring	for ② x 1 ③ x 1, ④ x 1	5-A, 5-B	3
6	PQ30250-2-2	Operation Button	REV/PLAY EK	5-A	1
	″ -3	″	″ EG	5-A	1
7	PQ30251-2	″	REW/FF EK	5-A	1
	″ -3	″	″ EG	5-A	1
8	PQ30260	Sub Button		5-A	1
9	PQ40796-2-2	Operation Button	REC EK	5-A	1
	″ -3-2	″	″ EG	5-A	1
10	PQM30002-122	C. Spring	for ⑨	5-A	1
11	–	–		–	–
⚠ 12	PQ10064K-9	Bottom Cover Ass'y	EK Incl. ⑬ – ⑳ , ㉒	4-B	1
⚠	PQ10064J-9	″	EG Incl. ″	4-B	1
13	PQ30310-10-4	Camera Connector Label	EK	5-D	1
	″ -9-4	″	EG	5-D	1
14	PQ30288-8-4	Battery Caution Label	EK	3-C	1
	″ -7-3	″	EG	3-C	1
15	PU47385	Caution Label	EK	5-D	1
	PU54498	″	EG	5-D	1
16	PQ30261-1-2	Terminal Cover		4-D	1
17	PQ40782	Foot		4-B	4
18	PQ30311-5	V. Lock Label	EK	4-C	1
	″ -6-2	″	EG	4-C	1
19	PQ40974-5-2	Cap	V-Position	4-C	1
20	PQ40781-10-3	″	RF EK	3-C	1
	″ -9-3	″	″ EG	3-C	1
21	–	–		–	–
22	PQM30022-14	Mark		4-D	1
⚠ 23	PQ40778-1-3	Side Plate (R)		5-C	1
⚠ 24	PQ40777-1-3	″ (L)		4-A	1
25	SSSP3006R	Screw		4-A, 5-C	4
26	SSSF3010M	Tap. Screw	EK	3-D	3
⚠ 27	PQ30254	Connector Cover		3-C	1
28	PQ30255-2-1	Connector Plate	EK	2-D	1
	″ -4	″	EG	2-D	1
29	PQ40983	Insulator		3-D	1
30	SDSP2606Z	Screw		3-D	1
31	PQ40775	Knob	TRACKING	3-D	1
⚠ 32	PQ30256-13	Rating Label	EK	5-B	1
⚠	″ -11	″	EG	5-B	1
⚠ 33	PQ20110J-2	Cassette Cover Ass'y	EK Incl. ㉞	1-C	1
⚠	PQ20110H-2	″	EG Incl. ″	1-C	1
34	PU35241-4	Label	EK	1-B	1
	″ -5	″	EG	1-B	1
35	SDSP3006M	Screw		1-B	3
36	–	Chassis Ass'y	See Section 5.2.4	3-A	1

5.2.3 Chassis assembly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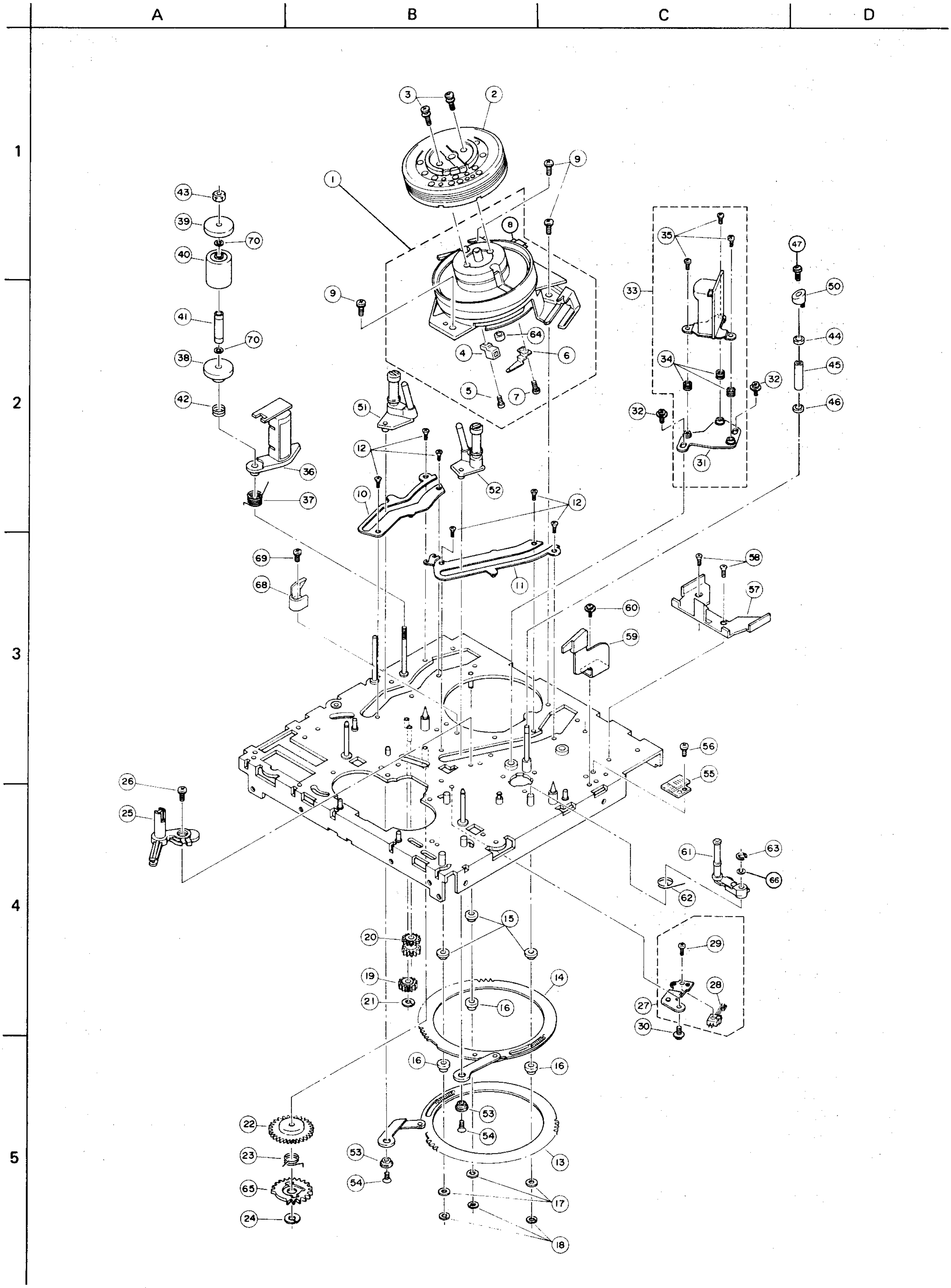
38

– Chassis assembly list –

Symbol No.	Part No.	Part Name	Description	Symbol No. Position	Q'ty
1	PQ10060-1-3	Frame		4-B	1
2	PQ41002	Earth Lug		4-C	1
3	–	–		–	–
4	SDSA3008Z	Tap. Screw		4-C	2
5	–	Mechanism Ass'y	See Section 5.2.5 and 5.2.6.	3-A	1
6	SSSP3012Z	Screw		4-B	2
7	DPSP3012Z	"		4-C	1
8	SSSP3006Z	"		3-B	3
9	–	Pre-amp Board Ass'y	See Section 6.2.5.	2-C	1
10	PU57112A	Shield Plate Ass'y		2-C	1
11	DPSP2006Z	Screw		2-C	2
12	PQ30340A	Shield Plate Ass'y		3-C	1
13	PQ30247-1-3	Shield Cover		2-B	1
14	LPSP2604Z	Screw		2-B	2
15	–	OSC Board Ass'y	See Section 6.2.7.	2-B	1
16	PU56562-2-2	Multi Connector	Incl. ⑰	3-C	1
17	PU56858	Micro Switch		3-C	1
⚠ 18	PU57495	RF Converter	EG	3-B	1
⚠	PU57500	"	EK	3-B	1
⚠ 19	PU56564B	Converter Board Ass'y	EG Incl. ⑱	3-B	1
⚠	PU56564C	"	EK Incl. "	3-B	1
20	PQ40773	Battery Stopper		3-C	1
21	PQ40774	Slider		3-C	1
22	PQM30002-113	C. Spring		3-C	1
23	" -114	"		3-C	1
24	SSSA3010Z	Tap. Screw		3-C	1
25	PU57033A-1	E. Sensor Board Ass'y		3-B	1
26	PU57034A-1	S. Sensor Board Ass'y		4-C	1
27	PU56800	Nylon Rivet		4-A, 4-C	2
28	–	MDA Board Ass'y	See Section 6.2.4.	4-D	1
29	–	Servo Board Ass'y	See Section 6.2.3.	3-C	1
30	SSSA2608M	Tap. Screw		3-D	1
31	SDSA2608Z	"		3-D	1
32	PU56571	Leaf Switch	REC Safety	3-A	1
33	–	Mechacon Board Ass'y	See Section 6.2.1.	5-A	1
34	–	Audio Board Ass'y	See Section 6.2.6.	4-D	1
35	–	–		–	–
36	–	Video Board Ass'y	See Section 6.2.2.	5-B	1
37	SDSA3008Z	Tap. Screw		5-C	2
38	DPSP2606Z	Screw		5-B	1
39	PUS27210C	C. Housing Ass'y	Incl. ㊼ – (54)	1-C	1
40	LPSP3004Z	Screw		1-B	3
41	PQ41253	Sheet		3-A, 4-C	2
42	PQ41256	Nut		3-C	1
43	PQ41072	Stop Plate		2-C	1
44	SDSA2606Z	Screw		3-C	1
45	PQ41137	Earth Plate		4-B	1
46	DPSP3004Z	Screw		3-B	1
47	PU56781	Damper		1-C	1
48	SPSP2006Z	Screw		2-C	1
49	PQ41036	Damper Gear		2-B	1
50	REE1500	E-Ring		2-B	1
51	PQM30001-166	T. Spring		1-A	1
52	" -167	"		1-B	1
53	" -177	"		2-B	2
54	PQM30017-1	Slit Washer		1-C	1

5.2.4 Mechanism assembly (1)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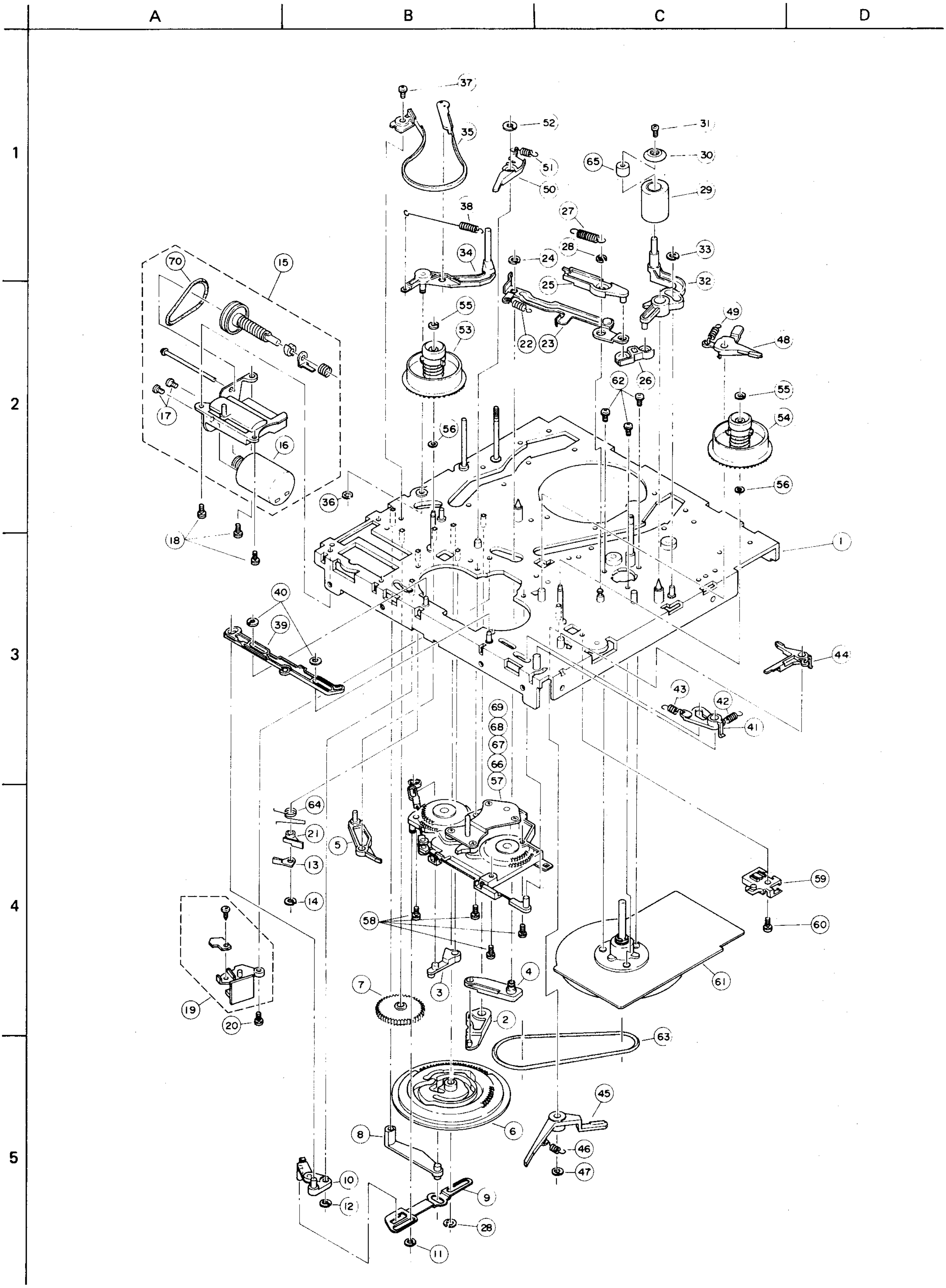
— Mechanism assembly (1) list —

Symbol No.	Part No.	Part Name	Description	Symbol No. Position	Q'ty
⚠ 1	PQ20024F-13	Lower Drum Motor Ass'y	Incl. ④ – ⑧ and (64)	1-B	1
2	PQ20016A-2	Upper Drum Ass'y		1-B	1
3	NDBP2608N	Screw		1-B	2
4	PQ40352B-2	PU Head Ass'y		2-B	1
5	SPSH1735Z	Mini Screw		2-B	1
6	PU56798-3	Brush Ass'y		2-B	1
7	LPSP2003Z	Screw		2-B	1
8	PU56202-2	Heater	or PU56202-4	1-B	1
9	LPSP2608Z	Screw		1-C, 2-B	3
10	PQ30264	Guide Rail (SUP)		2-B	1
11	PQ30265	" (TU)		3-B	1
12	PQ41269-2	Screw		2-B, 2-C	6
13	PQ40812A-1	Loading Ring Ass'y (SUP)		5-C	1
14	PQ40816A-1	" (TU)		4-C	1
15	PQ40819-1-2	Guide Roller (1)		4-B	3
16	PQ40820-1-2	" (2)		4-B, 5-B, C	3
17	PQM30005-40	Collar		5-C	3
18	PQM30017-22	Slit Washer		5-C	3
19	PQ40822	Connect Gear (1)		4-B	1
20	PQ40823	" (2)		4-B	1
21	PQM30017-24	Slit Washer		4-B	1
22	PQ30336	Loading Gear (1)		5-A	1
23	PQ41069	Torsion Spring		5-A	1
24	PQM30017-18	Slit Washer		5-A	1
25	PUS36752A	Cassette LED Ass'y		4-A	1
26	LPSP2606Z	Screw		3-A	1
27	PUS46515C	AL SW Ass'y	Incl. ㉘ and ㉙	4-C	1
28	PU56659	AL SW		4-C	1
29	SPSP2007Z	Screw		4-C	1
30	DPSP2604Z	"		4-C	1
31	PQ40877A	Head Base Ass'y		2-C	1
32	DPSP3007	Screw		2-C	2
33	PUS46521A	A/C Head Ass'y	Incl. ㉛ , ㉞ and ㉟	2-C	1
34	PU30080-49	C. Spring		2-C	3
35	SPSP2608Z	Screw		1-C	3
36	PQ40865A	FE Head Ass'y		2-B	1
37	PQ40871	Torsion Spring		2-B	1
38	PQ41216	Lower Flange		2-A	1
39	PQ40868-2	Upper Flange		1-A	1
40	PQ41192A	Roller Ass'y		1-A	1
41	PQ41217	Collar		2-A	1
42	PQM30002-124	C. Spring		2-A	1
43	NTS3000ZS	Nut		1-A	1
44	PQ40268-2	Guide Flange		2-D	1
45	PU53629-2	Tape Guide (Guide Pole)		2-D	1
46	PQ41348-2	Guide Flange		2-D	1
47	SDSP2006Z	Screw		1-D	1
48	—	—		—	—
49	—	—		—	—
50	PQ41346	G. Pole Cap		2-D	1
51	PQ40357B-1	Pole Base Ass'y (SUP)		2-B	1
52	PQ40354E-3	" (TU)		2-B	1
53	PQ40872	Spacer		5-B	2
54	PQ41269	Special Screw		5-B	2
55	PU56637B	Dew Sensor Ass'y		3-C	1
56	LPSP2604Z	Screw		3-C	1
57	PQ40875	Board Holder		3-C	1
58	SSSP2605Z	Screw		3-C	2
59	PQ40873A	Door Guide Ass'y		3-C	1
60	DPSP2605Z	Screw		3-C	1
61	PQ40993A-6	TU Guide Ass'y		4-C	1
62	PQ40994-1-2	Torsion Spring		4-C	1
63	REE2500	E-Ring		4-C	1
64	PU49483-2	Commutator		2-C	1
65	PQ30337	Loading Gear (2)		5-A	1
66	PQM30018-33	Washer		4-C	1
67	—	—		—	—
68	PQ41138	Stopper		3-A	1
69	LPSP2606Z	Screw		3-A	1
70	Q03093-819	Washer		2-A	2

5.2.5 Mechanism assembly (2)



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— Mechanism assembly (2) list —

Symbol No.	Part No.	Part Name	Description	Symbol No. Position	Q'ty
1	PQ10076B	Main Deck Ass'y		3-D	1
2	PQ40826	Cam Lever (1)		4-B	1
3	PQ40827	〃 (2)		4-B	1
4	PQ40828A	Relay Arm Ass'y		4-B	1
5	PQ40831A	Cancel Lever Ass'y		4-B	1
6	PQ20064-1-7	Control Cam		5-B	1
7	PQ40833	Worm Wheel		4-B	1
8	PQ40834A	Cam Lever (3) Ass'y		5-B	1
9	PQ40836-1-2	Slide Plate		5-B	1
10	PQ40837A-3	Relay Lever Ass'y		5-B	1
11	PQM30017-22	Slit Washer		5-B	1
12	〃 -23	〃		5-B	1
13	PQ41225-1-2	Cam Brake		4-A	1
14	PQM30017-23	Slit Washer		4-A	1
⚠ 15	PU56641A-6	Motor Bracket Ass'y	Incl. ⑯ , ⑰ and (70)	1-B	1
⚠ 16	PU56592V-1	Motor Ass'y (Mode Control)		2-A	1
17	SPSP2004Z	Screw		2-A	2
18	LPSP2605Z	〃		3-A	3
19	PUS46513C	Mode Sensor Board Ass'y		4-A	1
20	LPSP2606Z	Screw		4-A	1
21	PQ41226	Cam Brake 2		4-A	1
22	PQM30001-153	Spring		2-B	1
23	PQ30267B	P.R. Plate Ass'y	Incl. ㉒	2-C	1
24	PQM30017-23	Slit Washer		1-C	1
25	PQ40843	Toggle Arm (1)		2-C	1
26	PQ40844	〃 (2)		2-C	1
27	PQ41124-1-1	T. Spring		1-C	1
28	REE2500	E-Ring		1-C	1
29	PQ41125A	Pinch Roller Ass'y		1-C	1
30	PU53878	P.R. Cap		1-C	1
31	SPSP2005Z	Screw		1-C	1
32	PQ40845A-2	P.R. Arm Sub Ass'y		2-C	1
33	PQM30017-22	Slit Washer		1-C	1
34	PQ40848B	Tension Pole Ass'y		1-B	1
35	PQ40851A	Tension Band Ass'y		1-B	1
36	REE2000	E-Ring		2-B	1
37	LPSP2606Z	Screw		1-B	1
38	PQ40855-1-3	T. Spring		1-B	1
39	PQ30269-1-3	Control Plate		3-A	1
40	PQM30017-22	Slit Washer		3-A	2
41	PQ40856A	Eject Lever Ass'y	Incl. ㊷ and ㊸	3-C	1
42	PQM30001-156	T. Spring		3-C	1
43	〃 -157	〃		3-C	1
44	PQ40858B	Search Brake Ass'y		3-D	1
45	PQ30270A-1	Capstan Brake Ass'y	Incl. ㊻	5-C	1
46	PQM30001-158	T. Spring		5-C	1
47	PQM30017-23	Slit Washer		5-C	1
48	PQ40860A-2	REW Brake Ass'y	Incl. ㊾	2-C	1
49	PQM30001-159-5	T. Spring		2-C	1
50	PQ40862A-2	FF Brake Ass'y	Incl. (51)	1-C	1
51	PQM30001-160-5	T. Spring		1-C	1
52	PQM30017-24	Slit Washer		1-C	1
53	PU57581	Reel Disk (TU)		2-B	1
54	PU57580	〃 (SUP)		2-C	1
55	PQM30017-22	Slit Washer		2-C	2
56	Q03093-827	Washer		2-C	2
57	PU56647A-5	Clutch Mechanism Ass'y	Incl. (66) – (69)	3-B	1
58	LPSP2608Z	Screw		4-B	4
59	PUS46514B	TU Sensor Board Ass'y		4-D	1
60	LPSP2606Z	Screw		4-D	1
⚠ 61	PU56660V	Capstan Motor		4-C	1
62	LPSP2605Z	Screw		2-C	3
63	PQM30003-12	Belt (Reel)		5-C	1
64	PQ41252-2	Torsion Spring		4-A	1
65	PQM30005-39	Collar		1-C	1
66	PU56650-1-2	Clutch (TU)		3-B	1
67	PU56651-1-2	〃 (SUP)		3-B	1
68	Q03093-827	Washer	for Clutch	3-B	3
69	PQM30017-2	Slit Washer	for Clutch	3-B	3
70	PQM30003-15	Belt	for Mode Control Motor	1-A	1

SECTION 6
ELECTRICAL PARTS LIST

SAFETY PRECAUTION

Parts identified by the △ symbol are critical for safety. Replace only with specified part numbers.

ABBREVIATIONS IN THIS LIST ARE AS FOLLOWS:

RESISTORS -- All resistance values are in ohms (Ω).

K	1 000
M	1 000 000
CR	Carbon Resistor
Comp. R	Composition Resistor
WR	Wire Wound Resistor
OMR	Oxide Metal Film Resistor
VR	Variable Resistor (Potentiometer)
MFR	Metal Film Resistor
FR	Fusible Resistor
PMR	Precision Metal Film Resistor

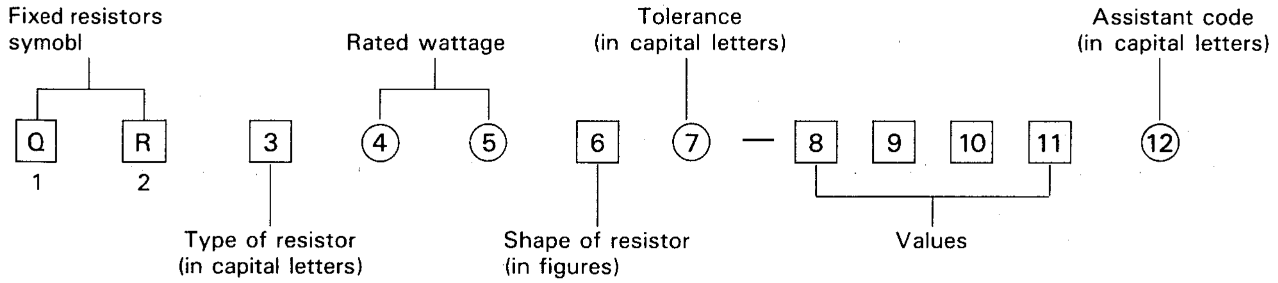
CAPACITORS – All capacitance values are in μF, unless otherwise indicated.

P	$\mu\mu$F
C Cap	Ceramic Capacitor
E Cap	Electrolytic Capacitor
FM Cap	Film Mica Capacitor
MM Cap	Metalized Mylar Capacitor
MP Cap	Metalized Paper Capacitor
MY Cap	Mylar Capacitor
NP Cap	Non-polar Capacitor
PC Cap	Polycarbonate Capacitor
PP Cap	Poly Pro Capacitor
PS Cap	Polystyrol Capacitor
T Cap	Tantalum Capacitor
TR Cap	Trimmer Capacitor
LL Cap	Low Leak Current Electrolytic Capacitor
TF Cap	Thin Film Capacitor

6.1 STANDARD PART NUMBER CODING

6.1.1 Fixed resistor coding

Fixed resistor part numbers are as follows.


Fixed resistors symobl
Rated wattage
Tolerance (in capital letters)
Assistant code (in capital letters)
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Type of resistor (in capital letters)
Shape of resistor (in figures)
Values

Type of resistor (third digit)

C	Composition resistors
D	Carbon film resistors
F	Unflammable resistors
G	Oxide metal film resistors
H	Fusible resistors
M	Metal plate resistors
S	Metal glazed resistors
V	Precision metal film resistors
W	Wire wound resistors
X	Metal film resistors
Z	Special resistors

Rated wattage (fourth and fifth digits)

A0	1/10 W
18	1/8 W
16	1/6 W
14	1/4 W
12	1/2 W
01	1 W
02	2 W
03	3 W
04	4 W
05	5 W
06	6 W
07	7 W
75	7.5 W
08	8 W
10	10 W
15	15 W
A6	16 W
20	20 W
30	30 W

Tolerance (seventh digit)

F	±1 %
G	±2 %
J	±5 %
K	±10 %
M	±20 %

Assistant code (twelfth digit)

A	Small type
B	Small type
S	Small type
Y	Lead taping
Z	Lead taping

Values (eighth – tenth or eleventh digits)

examples:

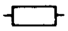
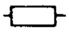
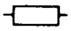
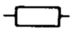
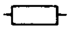
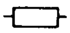
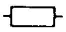
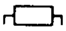
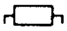
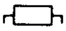
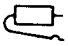
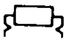
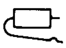
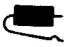
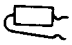
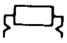
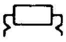
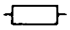
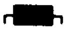
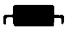
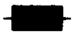
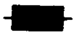
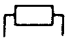
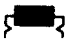
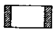
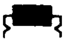
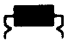
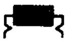
R47		0.47 Ω
4R7		4.7 Ω
470	47×10^{0}	47 Ω
471	47×10^{1}	470 Ω
472	47×10^{2}	4.7 kΩ
473	47×10^{3}	47 kΩ
474	47×10^{4}	470 kΩ
475	47×10^{5}	4.7 MΩ

QRV resistance shown by four digits:

4640	464×10^{0}	464 Ω
4641	464×10^{1}	4.64 kΩ
4642	464×10^{2}	46.4 kΩ

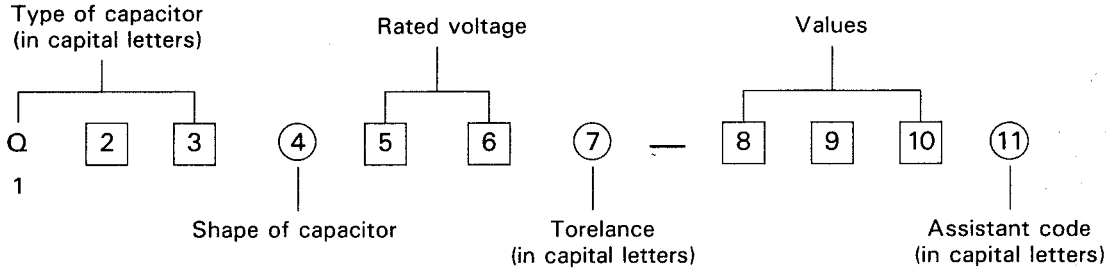
Shape of resistor (sixth digit)

Note: ■ marks are flame retardant resistor.

Type of resistor / Shape of resistor	C	D	F	G	H	M	S	V	W	X
1										
2										
3										
4										
5									(L) type	
6										
7			Lug (B) type							
8			Lug (A) type				 Chip			
9			Lug (C) type							

6.1.2 Fixed capacitor coding

Fixed capacitor part numbers are as follows.


Type of capacitor
(in capital letters)
Rated voltage
Values
Q
1
2
3
④
5
6
⑦
—
8
9
10
⑪
Shape of capacitor
Torelance
(in capital letters)
Assistant code
(in capital letters)

Ceramic capacitors

Type of capacitor (first — third digits)		Shape of capacitor (fourth digit)				
Symbol	Characteristics	Mono-direction	Kink lead	Axial lead	Axial forming lead	Chip
QCC	Ceramic	1		4	5	
QCD	High capacitance					A
QCF	High capacitance	1,4	3			8,A
QCS	Temperature compensation	1	3	4	5	8,A
QCT	Temperature compensation	Special coding				8,A
QCV	Ceramic			1	3	
QCX	Ceramic			1	3	
QCY	High capacitance	1,4	3	6	7	8,A
QCZ	Special type	Special coding				

Electrolytic capacitors

Type of capacitor (first-third digits)		Shape of capacitor (fourth digit)				
Symbol	Characteristics	Tubular	Mono-direction	Anti-stress	Forming	Snap-in
QEB	Low leakage		4	5	6	
QEC	Low leakage		4,8,A	9,B	6,C	
QEE	Tantalum (normal)		4	5	6	
	Tantalum (small)		8			
QEF	Chip tantalum	8 (chip type)				
QEG	Low impedance		4			
QEK	Miniature type		4	5	6	
QEL	Small type		4	5	6	7
QEM	Small type		4	5	6	
QEN	Non-polar	2	4	5	6	
QEP	Non-polar (small)		4,A	5,B	6,C	
QER	Miniature type		4	5	6	
QET	Small type	2	4	5,B	6,C	7
QEU	Small type		4	5	6	
QEV	Small type		4		6	7
QEW	Normal	2	4	5	6	7

Paper film capacitors

Type of capacitor (first — third digits)		Shape of capacitor (fourth digit)				
		Tubular	Normal		Flame retardant	
Symbol	Characteristics		Mono-direction	Kink lead	Mono-direction	Kink lead
QFA	Metalized polypropylene				7	
QFE	Metalized mylar				5	
QFF	Film mica		4			
QFG	Polypropylene film		4	8		
QFH	Metalized mylar	2	4	3	5,7	6
QFJ	Mylar (special)		4			
QFK	Metalized mylar (small)				5	
QFM	Mylar	2	4	3,7	5	6
QFN	Mylar (small)		4	3		
QFP	Polypropylene		4	3,8		
QFS	Polystyrole	2	4	3		
QFV	Thin film		4	8		
QFZ	Special type	Special coding				

Rated voltage (fifth and sixth digits)

Sixth digit / Fifth digit	A	B	C	D	E	F	G	H	J	K	V	W	X
0						3.15	4.0		6.3				
1	10		16	20	25		40	50	63	80	35		
2	100	125	160	200	250	315	400	500	630		350	450	600
3	1000	1250		2000				5000					

Tolerance (seventh digit)

A	$^{+100}_{-10}$ %	M	±20 %
F	±1 %	N	±30 %
G	±2 %	P	$^{+100}_{-0}$ %
H	$^{+50}_{-10}$ %	R	$^{+30}_{-10}$ %
J	±5 %	X	$^{+40}_{-20}$ %
K	±10 %	Z	$^{+80}_{-20}$ %

Values (eighth — tenth digits)

Example : Values are in picofarads

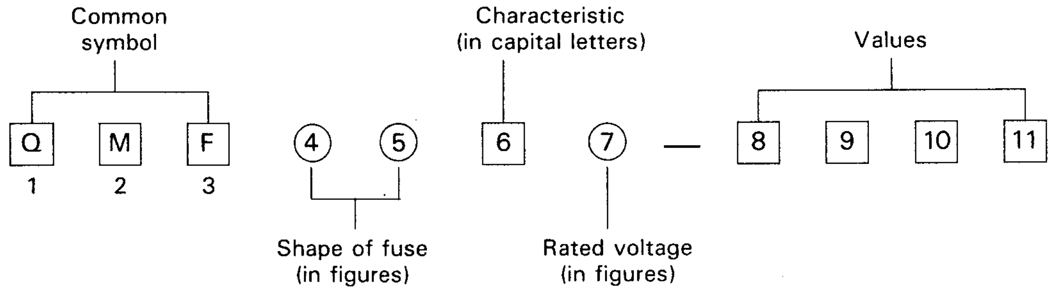
101 ....10×10^{1} pF............. 100 pF
102 ....10×10^{2} pF............. 1,000 pF (0.001 μF)
103 ....10×10^{3} pF............. 10,000 pF (0.01 μF)
104 ....10×10^{4} pF............. 100,000 pF (0.1 μF)
105 ....10×10^{5} pF............. 1 μF
5R0 .... 5.0 pF

Assistant code (eleventh digit)

G Small size
Z Lead taping

6.1.3 Fuse coding

Standard fuse part numbers are as follows.


Common symbol
Characteristic (in capital letters)
Values
Q
M
F
④
⑤
6
⑦
—
8
9
10
11
1
2
3
Shape of fuse (in figures)
Rated voltage (in figures)

Shape of fuse
(fourth and fifth digits)

51	ϕ5.2×20 mm
60	ϕ6.4×30 mm
61	ϕ6.35×31.8 mm
63	ϕ6.4×30 mm with lead wires
66	ϕ6.35×31.8 mm with lead wires
00	Special type

Rated voltage
(seventh digit)

1	AC125 V
2	AC250 V
3	0.1–1 A : AC250 V 1.25–6.3 A : AC125 V

Values
(eighth-tenth or eleventh digits)
example:

R63	.... 0.63 A
1R0	.... 1.0 A
2R5	.... 2.5 A
100	.... 10 A
R315	.... 0.315 A
1R25	.... 1.25 A

Characteristics (sixth digit)

Symbol	Fusing Current	Fusing Time	Remarks
A	210 %	Within 2 min.	Anti-rush type (for Europe)
	275 %	0.6 – 10 sec.	
	400 %	0.15 – 3 sec.	
	1000 %	0.02 – 0.3 sec.	
B	210 %	Within 30 min.	Regular fusible type (for SEMKO, Europe)
	275 %	0.05 – 2 sec.	
	400 %	0.01 – 0.3 sec.	
C	135 %	Within 1 hr.	Regular fusible type (for UL, Japan)
	200 %	Within 2 min.	
E	210 %	Within 2 min.	Anti-rush type (for Europe)
	275 %	0.6 – 10 sec.	
	400 %	0.15 – 3 sec.	
	1000 %	0.02 – 0.3 sec.	
J	135 %	Within 1 hr.	Anti-rush type
	200 %	Within 2 min.	
M	135 %	Within 1 hr.	Regular fusible type (for UL)
	200 %	Within 2 min.	
R	160 %	Within 1 hr.	Regular fusible type
	200 %	Within 2 min.	
S	160 %	Within 1 hr.	Anti-rush type
	200 %	Within 2 min.	
	700 % – 2000 %	Within 0.01 sec.	
U	135 %	Within 1 hr.	Anti-rush type (for UL)
	200 %	Within 2 min.	
	800 % – 2000 %	Within 0.01 sec.	

6.2 ELECTRICAL PARTS LIST BY ASSEMBLIES

6.2.1 Mechacon board ass'y $\boxed{0}\boxed{1}$ PU21823B-9

Symbol No.	Part No.	Part Name	Description
IC 1	HD6305X0A32P	CPU	
IC 2	S-81250HG	Reg. Transistor	
IC 3	IR3702	Integrated Circuit	Op-amp
IC 4	BA728	"	"
IC 5	BA6109U3	"	
Q 1	DTA114ES	D. Transistor	
Q 2	2SC3399	"	
Q 3	2SA1346	"	
Q 4	2SC3400	"	
Q 5	"	"	
Q 6	2SA1175	Transistor	
Q 7	2SC3400	D. Transistor	
Q 8	"	"	
Q 9	"	"	
Q10	2SA1346	"	
Q11	"	"	
Q12	"	"	
Q13	"	"	
Q14	2SC3400	"	
Q15	"	"	
Q16	"	"	
Q17	–	–	
Q18	2SC3400	D. Transistor	
Q19	"	"	
Q20	"	"	
Q21	"	"	
Q22	"	"	
Q23	"	"	
Q24	"	"	
Q25	"	"	
Q26	"	"	
Q27	"	"	
Q28	"	"	
Q29	–	–	
Q30	2SC3400	D. Transistor	
Q31	"	"	
Q32	2SA1346	"	
Q33	"	"	
Q34	"	"	
Q35	"	"	
Q36	"	"	
Q37	"	"	
Q38	2SC3400	"	
Q39	"	"	
Q40	–	–	
Q41	2SC3400	D. Transistor	
Q42	"	"	
Q43	N13T1	PUT	
Q44	DTC144WS	D. Transistor	
D 1	RD5.1EB1	Zener Diode	
D 2	1SS133	Diode	
D 3	"	"	
D 4	"	"	
D 5	RD3.3EB1	Zener Diode	

Symbol No.	Part No.	Part Name	Description
D 6	1SS133	Diode	
D 7	"	"	
D 8	–	–	
D 9	–	–	
D10	–	–	
D11	1SS133	Diode	
D12	"	"	
D13	"	"	
D14	RD12EB1	Zener Diode	
D15	RD8.2EB3	"	
D16	–	–	
D17	RD2.7EB1	Zener Diode	or HZ3A
LD 1	GL-3HD6	L.E.D.	STOP
LD 2	"	"	FF
LD 3	"	"	REW
LD 4	"	"	REV. PB
LD 5	"	"	PB
LD 6	"	"	STILL/PAUSE
LD 7	"	"	A. REC
LD 8	"	"	INST.
LD 9	"	"	REC
DA 1	DAN601	Diode Array	
DA 2	"	"	
DA 3	"	"	
DA 4	DAP201	"	
DA 5	"	"	
DA 6	"	"	
DA 7	"	"	
DA 8	"	"	
DA 9	"	"	
DA10	"	"	
DA11	"	"	
R 1	QRD161J-333	CR	33 K 1/6 W
R 2	" -103	"	10 K "
R 3	" -333	"	33 K "
R 4	" -473	"	47 K "
R 5	" -102	"	1 K "
R 6	" -102	"	1 K "
R 7	" -223	"	22 K "
R 8	" -473	"	47 K "
R 9	" -472	"	4.7 K "
R10	" -102	"	1 K "
R11	" -222	"	2.2 K "
R12	" -472	"	4.7 K "
R13	" -104	"	100 K "
R14	" -333	"	33 K "
R15	" -332	"	3.3 K "
R16	" -562	"	5.6 K "
R17	" -473	"	47 K "
R18	" -223	"	22 K "
R19	" -471	"	470 "
R20	" -331	"	330 "

Symbol No.	Part No.	Part Name	Description
R21	QRD161J-331	CR	330 1/6 W
R22	" -471	"	470 "
R23	" -471	"	470 "
R24	" -393	"	39 K "
R25	" -391	"	390 "
R26	" -822	"	8.2 K "
R27	" -273	"	27 K "
R28	QVZ3531-103	VR	10 K
R29	QRD161J-153	CR	15 K 1/6 W
R30	" -223	"	22 K "
R31	" -394	"	390 K "
R32	" -104	"	100 K "
R33	" -564	"	560 K "
R34	—	—	
R35	QRD161J-104	CR	100 K 1/6 W
R36	" -223	"	22 K "
R37	" -103	"	10 K "
R38	" -823	"	82 K "
R39	" -223	"	22 K "
R40	" -223	"	22 K "
R41	" -333	"	33 K "
R42	" -333	"	33 K "
R43	" -223	"	22 K "
R44	" -223	"	22 K "
R45	" -102	"	1 K "
R46	" -102	"	1 K "
R47	" -471	"	470 "
R48	" -471	"	470 "
R49	" -223	"	22 K "
R50	" -223	"	22 K "
R51	" -102	"	1 K "
R52	" -102	"	1 K "
R53	" -473	"	47 K "
R54	" -473	"	47 K "
R55	—	—	
R56	QRD161J-221	CR	220 1/6 W
R57	" -562	"	5.6 K "
R58	" -562	"	5.6 K "
R59	—	—	
R60	QRD161J-562	CR	5.6 K 1/6 W
R61	" -682	"	6.8 K "
R62	" -103	"	10 K "
R63	" -562	"	5.6 K "
R64	" -682	"	6.8 K "
R65	—	—	
R66	QRD163J-0R0	CR	0 1/6 W
R67	QRD161J-0R0	"	0 "
R68	" -472	"	4.7 K 1/6 W
R69	" -0R0	"	0
R70	" -101	"	100 1/6 W
R71	—	—	
R72	QRD161J-102	CR	1 K 1/6 W
RA 1	EXB-LD4103G	Resistor Array	
RA 2	RGLD6X472G	"	

Symbol No.	Part No.	Part Name	Description
C 1	QER41HM-225	E Cap	2.2 50 V
C 2	QER40JM-107	"	100 6.3 V
C 3	QCS11HJ-330	C Cap	33 P 50 V
C 4	" -330	"	33 P "
C 5	QER41CM-106	E Cap	10 16 V
C 6	QER40JM-107	"	100 6.3 V
C 7	QCS11HJ-181	C Cap	180 P 50 V
C 8	QER41CM-106	E Cap	10 16 V
C 9	QCF11EZ-472	C Cap	0.0047 25 V
C10	QER41CM-106	E Cap	10 16 V
C11	" -106	"	10 "
C12	—	—	
C13	QER41CM-106	E Cap	10 16 V
C14	—	—	
C15	QER41CM-106	E Cap	10 16 V
C16	QFN41HJ-103	MY Cap	0.01 50 V
C17	" -103	"	0.01 "
C18	" -103	"	0.01 "
C19	" -103	"	0.01 "
C20	—	—	
C21	—	—	
C22	—	—	
C23	QEPA1HM-105	NP Cap	1 50 V
TH 1	PU52108-2R2	Posistor	
S 1	PU53598	Tact Switch	STOP
S 2	"	"	FF
S 3	"	"	REW
S 4	"	"	REV. PB
S 5	"	"	PB
S 6	"	"	STILL/PAUSE
S 7	"	"	A. REC
S 8	"	"	INST.
S 9	"	"	REC
S10	—	—	
S11	PU53598	Tact Switch	EJECT
S12	—	—	
S13	PU53598	Tact Switch	PWR SW
CF 1	PU55812	C. Resonator	4 MHz
CNT 1	S8055VT	Counter	or 8055V1T
	PQ30245-1-1	Counter Holder	
	SPSF2005Z	Tap. Screw	
	SPSF2006Z	Screw	
	PU56577	Flat Wire	
	PQ40937	LED Spacer	
	PU56008	Test Pin	TP1, 2
CN 1	PU56258-12	Cap. Housing	
CN 2	" -12	"	
CN 3	" -12	"	
CN 4	" -12	"	
CN 5	PU54537-4	"	
CN 6	" -2R	"	
CN 7	" -3R	"	
CN 8	" -3	"	
CN 9	" -2	"	
CN10	" -2R	"	
CN11	" -2	"	
CN12	" -2Y	"	
	SUB PWB ASS'Y		**PU57959A**
Q50	2SC3400	D. Transistor	Incl. PU57959A
Q51	"	"	"
Q52	"	"	"

6.2.2 Video board ass'y $\boxed{0}\boxed{2}$ .... PU11101A ... EG
PU11101B ... EK

Symbol No.	Part No.	Part Name	Description
[Peripheral section]			
Q301	2SC1545A,B	Transistor	
Q302	"	"	
Q303	2SA881Q,R	"	
Q304	DTC114YS	D. Transistor	
Q305	–	–	
Q306	2SC3400	Transistor	
Q307	DTA144F	D. Transistor	
Q308	DTC144F	"	
D301	1SS133	Diode	
D302	"	"	
D303	"	"	
D304	"	"	
D305	"	"	
D306	"	"	
R301	QRD161J-104	CR	100 K 1/6 W
R302	" -104	"	100 K "
R303	" -104	"	100 K "
R304	" -104	"	100 K "
R305	" -472	"	4.7 K "
R306	" -102	"	1 K "
R307	" -103	"	10 K "
R308	" -153	"	15 K "
R309	" -102	"	1 K "
R310	" -473	"	47 K "
R311	" -473	"	47 K "
R312	" -121	"	120 "
R313	–	–	
R314	QRD161J-103	CR	10 K 1/6 W
R315	" -222	"	2.2 K "
R316	QRD187J-1R0	"	1 1/8 W
C301	QCS11HJ-101	C Cap	100 50 V
C302	" -821	"	820 "
C303	QFN41HJ-562	MY Cap	0.0056 "
C304	–	–	
C305	–	–	
C306	QER41CM-106	E Cap	10 16 V
	PU51212	Fuse Clip	for F 1
RL301	PU56400-2	Relay	
	PU56008	Test Pin	
	PQ40776	Camera Bracket	
	LPSP2606Z	Screw	CA Conn.
	PU56729	Wire Clamp	
	PU56730	Spacer	
	LPSP2608Z	Screw	CA Conn.
	NTS2600Z	Nut	CA Conn.
The following not included in the Board Ass'y			
⚠F 1	QMF51E2-2R5	Fuse	2.5 A 250 V

Symbol No.	Part No.	Part Name	Description
[Luminance section]			
IC 1	T8004	Integrated Circuit	
IC 2	TL8704P	"	
IC 3	–	–	
IC 4	AN6327	Integrated Circuit	
IC 5	5VT09	"	
IC 6	AN6393	"	
IC 7	AN6306	"	
IC 8	AN6392	"	
Q 1	2SC2785HF,FF,EF	Transistor	
Q 2	–	–	
Q 3	2SC2021Q,R,S	Transistor	
Q 4	2SA1346	D. Transistor	
Q 5	2SA1175	Transistor	
Q 6	2SC2785HF,FF,EF	"	
Q 7	2SC2787LF	"	
Q 8	2SB851Q,R	"	
Q 9	2SC3400	D. Transistor	
Q10	2SA1175	Transistor	
Q11	–	–	
Q12	2SC2785HF,FF,EF	Transistor	
Q13	"	"	
Q14	2SA1175	"	
Q15	"	"	
Q16	2SC2785HF,FF,EF	"	
Q17	2SC3400	D. Transistor	
Q18	–	–	
Q19	2SA1175	Transistor	
Q20	2SC2785HF,FF,EF	"	
Q21	"	"	
Q22	2SA1175	"	
Q23	"	"	
Q24	"	"	
Q25	2SC2785HF,FF,EF	"	
Q26	2SC3400	D. Transistor	
Q27	2SC2785HF,FF,EF	Transistor	
Q28	"	"	
Q29	2SC3400	D. Transistor	
Q30	2SB643R,S	Transistor	
Q31	"	"	
Q32	2SC2785HF,FF,EF	"	
Q33	2SB851Q,R	"	
Q34	2SC3400	D. Transistor	
Q35	2SC2785HF,FF,EF	Transistor	
Q36	2SD1055P,Q	"	
Q37	2SC2785HF,FF,EF	"	
Q38	2SC2785FF	"	
Q39	2SA1175FF	"	
D 1	1SS133	Diode	
D 2	OA90	"	
D 3	1SS133	"	
D 4	"	"	
D 5	"	"	
D 6	1SS99	"	
D 7	RD3.3EB	Zener Diode	
D 8	1SS99	Diode	
D 9	"	"	

Symbol No.	Part No.	Part Name	Description
D10	–	–	
D11	RD10EB3	Zener Diode	
D12	1SS133	Diode	
D13	″	″	
D14	″	″	
D15	″	″	
D16	″	″	
D17	″	″	
D18	″	″	
R 1	–	–	
R 2	QRD161J-182	CR	1.8 K 1/6 W
R 3	″ -392	″	3.9 K ″
R 4	″ -821	″	820 ″
R 5	″ -272	″	2.7 K ″
R 6	″ -684	″	680 K ″
R 7	″ -0R0	″	0 ″
R 8	″ -182	″	1.8 K ″
R 9	″ -102	″	1 K ″
R10	″ -331	″	330 ″
R11	″ -393	″	39 K ″
R12	″ -223	″	22 K ″
R13	″ -103	″	10 K ″
R14	QVZ3531-222	VR	2.2 K
R15	QRD161J-222	CR	2.2 K ″
R16	″ -473	″	47 K ″
R17	″ -183	″	18 K ″
R18	QVZ3531-102	VR	1 K
R19	QRD161J-102	CR	1 K 1/6 W
R20	″ -331	″	330 ″
R21	″ -181	″	180 ″
R22	″ -561	″	560 ″
R23	″ -822	″	8.2 K ″
R24	″ -333	″	33 K ″
R25	″ -182	″	1.8 K ″
R26	–	–	
R27	QRD161J-682	CR	6.8 K 1/6 W
R28	″ -223	″	22 K ″
R29	″ -103	″	10 K ″
R30	–	–	
R31	QRD161J-822	CR	8.2 K 1/6 W
R32	″ -473	″	47 K ″
R33	″ -222	″	2.2 K ″
R34	″ -331	″	330 ″
R35	″ -564	″	560 K ″
R36	″ -122	″	1.2 K ″
R37	″ -102	″	1 K ″
R38	″ -684	″	680 K ″
R39	″ -154	″	150 K ″
R40	″ -100	″	10 ″
R41	″ -222	″	2.2 K ″
R42	″ -681	″	680 ″
R43	″ -821	″	820 ″
R44	″ -392	″	3.9 K ″
R45	″ -103	″	10 K ″
R46	″ -122	″	1.2 K ″
R47	–	–	
R48	QRD161J-0R0	CR	0 1/6 W
R49	–	–	
R50	QRD161J-102	CR	1 K 1/6 W
R51	QVZ3531-222	VR	2.2 K
R52	QRD161J-102	CR	1 K 1/6 W
R53	″ -222	″	2.2 K ″
R54	″ -102	″	1 K ″
R55	″ -152	″	1.5 K ″
R56	QRD161J-181	CR	180 1/6 W
R57	″ -102	″	1 K ″
R58	″ -223	″	22 K ″
R59	″ -102	″	1 K ″
R60	″ -102	″	1 K ″
R61	″ -750	″	75 ″
R62	″ -330	″	33 ″
R63	″ -222	″	2.2 K ″
R64	″ -103	″	10 K ″
R65	″ -222	″	2.2 K ″
R66	″ -750	″	75 ″
R67	″ -681	″	680 ″
R68	″ -681	″	680 ″
R69	″ -103	″	10 K ″
R70	″ -103	″	10 K ″
R71	″ -221	″	220 ″
R72	″ -122	″	1.2 K ″
R73	″ -332	″	3.3 K ″
R74	″ -102	″	1 K ″
R75	″ -102	″	1 K ″
R76	″ -183	″	18 K ″
R77	″ -393	″	39 K ″
R78	″ -332	″	3.3 K ″
R79	″ -224	″	220 K ″
R80	QVZ3531-103	VR	10 K
R81	–	–	
R82	QRD161J-563	CR	56 K 1/6 W
R83	″ -682	″	6.8 K ″
R84	QVZ3531-103	VR	10 K
R85	–	–	
R86	QRD161J-0R0	CR	0 1/6 W
R87	QVZ3531-222	VR	2.2 K
R88	QRD161J-103	CR	10 K 1/6 W
R89	″ -223	″	22 K ″
R90	″ -331	″	330 ″
R91	″ -681	″	680 ″
R92	″ -181	″	180 ″
R93	″ -103	″	10 K ″
R94	″ -102	″	1 K ″
R95	–	–	
R96	QRD161J-332	CR	3.3 K 1/6 W
R97	″ -152	″	1.5 K ″
R98	″ -221	″	220 ″
R99	″ -562	″	5.6 K ″
R100	″ -152	″	1.5 K ″
R101	″ -272	″	2.7 K ″
R102	″ -181	″	180 ″
R103	″ -222	″	2.2 K ″
R104	″ -222	″	2.2 K ″
R105	″ -222	″	2.2 K ″
R106	″ -222	″	2.2 K ″
R107	″ -332	″	3.3 K ″
R108	″ -682	″	6.8 K ″
R109	″ -272	″	2.7 K ″
R110	QVZ3531-682	VR	6.8 K
R111	″ -103	″	10 K
R112	–	–	
R113	QVZ3531-103	VR	10 K
R114	QRD161J-103	CR	10 K 1/6 W
R115	″ -822	″	8.2 K ″
R116	″ -470	″	47 ″
R117	″ -393	″	39 K ″
R118	″ -563	″	56 K ″
R119	″ -563	″	56 K ″
R120	″ -223	″	22 K ″

Symbol No.	Part No.	Part Name	Description
R121	QRD161J-223	CR	22 K 1/6 W
R122	" -222	"	2.2 K "
R123	" -102	"	1 K "
R124	" -392	"	3.9 K "
R125	" -121	"	120 "
R126	" -152	"	1.5 K "
R127	" -820	"	82 "
R128	" -393	"	39 K "
R129	" -331	"	330 "
R130	" -223	"	22 K "
R131	" -103	"	10 K "
R132	" -222	"	2.2 K "
R133	" -103	"	10 K "
R134	" -222	"	2.2 K "
R135	" -104	"	100 K "
R136	" -473	"	47 K "
R137	" -822	"	8.2 K "
R138	" -102	"	1 K "
R139	" -430	"	43 "
R140	" -122	"	1.2 K "
R141	" -182	"	1.8 K "
R142	" -102	"	1 K "
R143	" -223	"	22 K "
R144	" -102	"	1 K "
R145	" -103	"	10 K "
R146	–	–	
R147	–	–	
R148	QRD161J-222	CR	2.2 K 1/6 W
R149	–	–	
R150	QRD161J-4R7	CR	4.7 1/6 W
R151	" -4R7	"	4.7 "
R152	" -103	"	10 K "
R153	" -222	"	2.2 K "
R154	" -152	"	1.5 K "
R155	" -824	"	820 K "
R156	" -152	"	1.5 K "
R157	" -821	"	820 "
B 1	–	–	
B 2	QRD187J-0R0	CR	0
B 3	QRD161J-0R0	"	0
B 4	" -0R0	"	0
B 5	" -0R0	"	0
B 6	QRD187J-0R0	"	0
B 7	QRD161J-0R0	"	0 EK only
B 8	–	–	
B 9	QRD167J-0R0	CR	0

Symbol No.	Part No.	Part Name	Description
C 1	–	–	
C 2	–	–	
C 3	PU51163-271	C Cap	270 50 V
C 4	QCS11HJ-220	"	22 P "
C 5	QCS51HJ-680	"	68 P "
C 6	QCY71HK-181	"	180 "
C 7	" -181	"	180 "
C 8	–	–	
C 9	–	–	
C10	QCS51HJ-390	C Cap	39 P 50 V
C11	" -560	"	56 P "
C12	QCS11HJ-8R0	"	8 P "
C13	QCX31EM-103	"	0.01 25 V
C14	QER40JM-476	E Cap	47 6.3 V
C15	QCF11HP-103	C Cap	0.01 50 V
C16	QEPA1HM-474	NP Cap	0.47 "
C17	QER41HM-104	E Cap	0.1 "
C18	" -105	"	1 "
C19	QER41CM-106	"	10 16 V
C20	" -106	"	10 "
C21	QCS11HJ-270	C Cap	27 P 50 V
C22	" -820	"	82 P "
C23	" -270	"	27 P "
C24	" -560	"	56 P "
C25	" -560	"	56 P "
C26	QCS51HJ-101	"	100 P "
C27	QCX31EM-153	"	0.015 25 V
C28	QER41CM-106	E Cap	10 16 V
C29	QCX31EM-153	C Cap	0.015 25 V
C30	QER41HM-105	E Cap	1 50 V
C31	" -105	"	1 "
C32	QCX31EM-153	C Cap	0.015 25 V
C33	QCF11HP-103	"	0.01 50 V
C34	QCX31EM-153	"	0.015 25 V
C35	QER41HM-104	E Cap	0.1 50 V
C36	QCX31EM-153	C Cap	0.015 25 V
C37	QER41CM-476	E Cap	47 16 V
C38	QFN41HJ-222	MY Cap	0.0022 50 V
C39	QCV31HK-222	C Cap	0.0022 "
C40	QCY71HK-102	"	0.001 "
C41	QCX31EM-103	"	0.01 25 V
C42	" -103	"	0.01 "
C43	QCT05CH-390	"	39 P
C44	QCS11HJ-221	"	220 P 50 V
C45	QER41EM-475	E Cap	4.7 25 V
C46	QER41CM-106	"	10 16 V
C47	" -106	"	10 "
C48	QCS11HJ-101	C Cap	100 P 50 V
C49	QER41HM-105	E Cap	1 "
C50	QEPA1HM-105	NP Cap	1 "
C51	QCS11HJ-221	C Cap	220 P "
C52	QER41HM-105	E Cap	1 "
C53	QER40JM-107	"	100 6.3 V
C54	QCF11HP-103	C Cap	0.01 50 V
C55	QCS11HJ-220	"	22 P "
C56	QCF11HP-103	"	0.01 "
C57	" -103	"	0.01 "
C58	QCX31EM-103	"	0.01 25 V
C59	" -103	"	0.01 "
C60	" -103	"	0.01 "
C61	QCT05CH-330	"	33
C62	QCX31EM-153	"	0.015 25 V
C63	QCS51HJ-470	"	47 P 50 V
C64	QCX31EM-153	"	0.015 25 V
C65	" -103	"	0.01 "

Symbol No.	Part No.	Part Name	Description
C66	QFN41HJ-223	MY Cap	0.022 50 V
C67	QCS51HJ-560	C Cap	56 P "
C68	QCF11HP-103	"	0.01 "
C69	QER40JM-476	E Cap	47 6.3 V
C70	QCX31EM-103	C Cap	0.01 25 V
C71	QCS41HJ-470	"	47 P 50 V
C72	QCS11HJ-270	"	27 P "
C73	" -680	"	68 P "
C74	QCF11HP-103	"	0.01 "
C75	QCS11HJ-101	"	100 P "
C76	–	–	
C77	QCS11HJ-471	C Cap	470 P 50 V
C78	–	–	
C79	PU54990-3	E Cap	
C80	QER41CM-476	"	47 16 V
C81	QCF11HP-103	C Cap	0.01 50 V
C82	" -103	"	0.01 "
C83	QER41CM-476	E Cap	47 16 V
C84	QER41AM-226	"	22 10 V
C85	QCX31EM-153	C Cap	0.015 25 V
C86	QER40JM-476	E Cap	47 6.3 V
C87	QER41CM-106	"	10 16 V
C88	QER41EM-475	"	4.7 25 V
C89	QER40GM-227	"	220 4 V
C90	QER41EM-335	"	3.3 25 V
C91	QCF11HP-103	C Cap	0.01 50 V
C92	QCS11HJ-121	"	120 P "
C93	QER40JM-107	E Cap	100 6.3 V
C94	QCF11HP-103	C Cap	0.01 50 V
C95	" -103	"	0.01 "
C96	" -103	"	0.01 "
C97	" -103	"	0.01 "
C98	QCS51HJ-121	"	120 P "
C99	" -121	"	120 P "
C100	–	–	
C101	QER40JM-476	E Cap	47 6.3 V
C102	QER41HM-105	"	1 50 V
C103	QER41CM-106	"	10 16 V
C104	QCY71HK-331	C Cap	330 P 50 V
C105	" -391	"	390 P "
C106	QER41EM-475	E Cap	4.7 25 V
C107	PU51163-181	C Cap	180 P
C108	–	–	
C109	QCF11HP-103	C Cap	0.01 50 V
C110	QCX31EM-153	"	0.015 25 V
C111	" -153	"	0.015 "
C112	QCS11HJ-470	"	47 P 50 V
C113	QCF11HP-223	"	0.022 "
C114	QER41HM-105	E Cap	1 "
C115	QCF11HP-103	C Cap	0.01 "
C116	QER41CM-106	E Cap	10 16 V
C117	" -476	"	47 "
C118	QCF11HP-103	C Cap	0.01 50 V
C119	QER41CM-106	E Cap	10 16 V
C120	QCX31EM-153	C Cap	0.015 25 V
C121	QCS11HJ-121	"	120 P 50 V
C122	QCY71HJ-151	"	150 P "
C123	QCS11HJ-270	"	27 P "
C124	–	–	
C125	QEPA0JM-476	NP Cap	47 6.3 V
C126	QCT05CH-390	C Cap	39 P
C127	QER41HM-224	E Cap	0.22 50 V
C128	QCS11HJ-470	C Cap	47 P "
C129	QCX31EM-153	"	0.015 25 V
C130	QCS11HJ-7R0	"	7 P 50 V

Symbol No.	Part No.	Part Name	Description
C131	QCS11HJ-100	C Cap	10 P 50 V
C132	–	–	
C133	QCS11HJ-680	C Cap	68 P 50 V
C134	QFN41HJ-563	MY Cap	0.056 "
C135	QER40JM-476	E Cap	47 6.3 V
C136	QCF11HP-223	C Cap	0.022 50 V
C137	" -103	"	0.01 "
C138	QCS11HJ-150	"	15 P "
L 1	–	–	
L 2	PU53618-391JF	Peaking Coil	390
L 3	PU53223-470JG	"	47 µH
L 4	–	–	
L 5	PU53223-270JG	Peaking Coil	27 µH
L 6	" -470JG	"	47 µH
L 7	" -101G	"	100 µH
L 8	" -2R7KG	"	2.7 µH
L 9	" -8R2JG	"	8.2 µH
L10	" -680JG	"	68 µH
L11	" -680JG	"	68 µH
L12	" -101G	"	100 µH
L13	" -101G	"	100 µH
L14	" -180JG	"	18 µH
L15	" -180JG	"	18 µH
L16	" -101JG	"	100 µH
L17	" -120JG	"	12 µH
L18	" -180JG	"	18 µH
L19	" -101G	"	100 µH
L20	" -470JG	"	47 µH
L21	" -151JG	"	150 µH
L22	" -101G	"	100 µH
L23	" -101G	"	100 µH
L24	" -101G	"	100 µH
L25	" -680JG	"	68 µH
L26	" -271JG	"	270 µH
L27	" -181JG	"	180 µH
L28	" -100JG	"	10 µH
L29	" -101G	"	100 µH
L30	" -101JG	"	100 µH
LPF 1	PU57122	Low Pass Filter	
CF 1	PU57073	Ceramic Filter	13.29 MHz
IB 1	PU35238-001	Inline Block	
EQ 1	PU57219	Equalizer	
EQ 2	PU54838	"	EG only

Symbol No.	Part No.	Part Name	Description
[Color section]			
IC201	HA11756	Integrated Circuit	
IC202	BA7007	"	EG only
Q201	2SC2785HF,FF,EF	Transistor	
Q202	"	"	
Q203	"	"	
Q204	"	"	
Q205	2SC3400	D. Transistor	
Q206	–	–	
Q207	2SC2785HF,FF,EF	Transistor	
Q208	2SB643R,S	"	
Q209	2SC2785HF,FF,EF	"	
Q210	"	"	EG only
Q211	"	"	
Q212	"	"	
Q213	"	"	
Q214	2SA1346	D. Transistor	
Q215	2SC3400	"	EG only
Q216	2SC2787LF	Transistor	
Q217	2SC2785HF,FF,EF	"	
Q218	2SC3400	D. Transistor	EG only
Q219	"	"	"
Q220	2SC2785HF,FF,EF	Transistor	"
Q221	"	"	
Q222	"	"	
Q223	2SC3400	D. Transistor	
Q224	"	"	
Q225	2SB643R,S	Transistor	EG only
Q226	2SA1346	D. Transistor	
Q227	2SC3400	"	
D201	1SS133	Diode	EG only
D202	"	"	"
D203	"	"	
D204	"	"	EG only
D205	"	"	"
R201	QVZ3531-331	VR	330
R202	QRD161J-681	CR	680 1/6 W
R203	" -102	"	1 K "
R204	" -103	"	10 K "
R205	" -121	"	120 "
R206	" -102	"	1 K "
R207	" -122	"	1.2 K "
R208	" -102	"	1 K "
R209	" -102	"	1 K "
R210	" -183	"	18 K "
R211	" -562	"	5.6 K "
R212	" -682	"	6.8 K "
R213	" -152	"	1.5 K "
R214	" -222	"	2.2 K "
R215	" -222	"	2.2 K "
R216	" -122	"	1.2 K "
R217	–	–	
R218	QRD161J-152	CR	1.5 K 1/6 W
R219	" -472	"	4.7 K "
R220	QVZ3531-223	VR	22 K

Symbol No.	Part No.	Part Name	Description
R221	QRD161J-472	CR	4.7 K 1/6 W
R222	QVZ3531-103	VR	10 K
R223	QRD161J-332	CR	3.3 K 1/6 W
R224	" -561	"	560 "
R225	" -102	"	1 K "
R226	" -102	"	1 K "
R227	" -222	"	2.2 K "
R228	" -103	"	10 K "
R229	" -222	"	2.2 K "
R230	" -102	"	1 K "
R231	" -272	"	2.7 K "
R232	" -391	"	390 "
R233	" -223	"	22 K " EG only
R234	" -102	"	1 K "
R235	" -102	"	1 K "
R236	" -473	"	47 K "
R237	" -274	"	270 K "
R238	" -472	"	4.7 K "
R239	QVZ3531-103	VR	10 K
R240	QRD161J-103	CR	10 K 1/6 W
R241	" -103	"	10 K "
R242	" -681	"	680 "
R243	QVZ3531-102	VR	1 K
R244	QRD161J-391	CR	390 1/6 W
R245	" -471	"	470 "
R246	" -122	"	1.2 K "
R247	" -821	"	820 "
R248	" -331	"	330 "
R249	" -102	"	1 K "
R250	" -222	"	2.2 K "
R251	" -103	"	10 K " EG only
R252	–	–	
R253	QRD161J-102	CR	1 K 1/6 W EG only
R254	" -154	"	150 K " "
R255	" -683	"	68 K " "
R256	" -182	"	1.8 K " "
R257	QVZ3531-102	VR	1 K "
R258	–	–	
R259	QRD161J-103	CR	10 K 1/6 W EG only
R260	" -333	"	33 K " "
R261	" -562	"	5.6 K " "
R262	" -103	"	10 K " "
R263	–	–	
R264	QRD161J-223	CR	22 K 1/6 W
R265	" -102	"	1 K "
R266	" -103	"	10 K "
R267	" -104	"	100 K "
R268	" -331	"	330 " EG only
R269	" -153	"	15 K "
R270	" -183	"	18 K " EG only
R271	" -183	"	18 K "
R272	" -183	"	18 K "
R273	" -103	"	10 K "
R274	" -273	"	27 K "
R275	" -221	"	220 "
R276	" -222	"	2.2 K " EG only
R277	" -103	"	10 K " "
R278	" -472	"	4.7 K " "
R279	" -820	"	82 "
B200	QRD161J-0R0	CR	0 1/6 W EK only

Symbol No.	Part No.	Part Name	Description
C201	QCF11HP-103	C Cap	0.01 50 V
C202	QFN41HJ-333	MY Cap	0.033 ″
C203	QCF11HP-103	C Cap	0.01 ″
C204	—	—	
C205	—	—	
C206	QCF11HP-103	C Cap	0.01 50 V
C207	QEE41VM-684	TAN Cap	0.68 35 V
C208	QCF11HP-103	C Cap	0.01 50 V
C209	QFN41HJ-102	MY Cap	0.001 ″
C210	QCS11HJ-101	C Cap	100 P ″
C211	QFN41HJ-473	MY Cap	0.047 ″
C212	QER41EM-475	E Cap	4.7 25 V
C213	″ -475	″	4.7 ″
C214	QCF11HP-103	C Cap	0.01 50 V
C215	″ -103	″	0.01 ″
C216	″ -103	″	0.01 ″
C217	″ -103	″	0.01 ″
C218	″ -103	″	0.01 ″
C219	″ -223	″	0.022 ″
C220	QER41HM-225	E Cap	2.2 ″
C221	QCF11HP-103	C Cap	0.01 ″
C222	QER40JM-476	E Cap	47 6.3 V
C223	QCF11HP-103	C Cap	0.01 50 V
C224	QFN41HJ-472	MY Cap	0.0047 ″
C225	QER40JM-107	E Cap	100 6.3 V
C226	QCF11HP-103	C Cap	0.01 50 V
C227	QFN41HJ-223	MY Cap	0.022 ″
C228	QER41HM-105	E Cap	1 ″
C229	—	—	
C230	QFN41HJ-563	MY Cap	0.056 50 V
C231	QEE41VK-224	TAN Cap	0.22 35 V
C232	QEE41AM-685	″	6.8 10 V
C233	QCT05CH-180	C Cap	18 P
C234	″ -180	″	18 P
C235	″ -470	″	47 P
C236	QFN41HJ-682	MY Cap	0.0068 50 V
C237	QCF11HP-103	C Cap	0.01 ″
C238	QFN41HJ-473	MY Cap	0.047 ″
C239	QCF11HP-103	C Cap	0.01 ″ EG only
C240	QCS11HJ-470	″	47 P ″
C241	QCF11HP-103	″	0.01 ″
C242	QCS11HJ-101	″	100 P ″
C243	QCF11HP-103	″	0.01 ″
C244	QCS11HJ-101	″	100 P ″
C245	QCF11HP-103	″	0.01 ″
C246	QCX31EM-103	″	0.01 25 V
C247	QCF11HP-103	″	0.01 50 V
C248	QCX31EM-103	″	0.01 25 V EG only
C249	QER40JM-476	E Cap	47 6.3 V
C250	QCX31EM-103	C Cap	0.01 25 V
C251	QER41AM-336	E Cap	33 10 V EG only
C252	QER40JM-476	″	47 6.3 V ″
C253	QCF11HP-103	C Cap	0.01 50 V ″
C254	QER41CM-106	E Cap	10 16 V ″
C255	QFN41HJ-182	MY Cap	0.0018 50 V ″
C256	″ -272	″	0.0027 ″ ″
C257	QCF11HP-103	C Cap	0.01 ″
C258	—	—	
C259	QCS11HJ-101	C Cap	100 P 50 V
C260	QCF11HP-103	″	0.01 ″ EG only
C261	″ -103	″	0.01 ″
C262	QFN41HJ-473	MY Cap	0.047 ″ EG only
C263	QCS11HJ-680	C Cap	68 P ″ ″
C264	QFN41HJ-104	MY Cap	0.1 ″
C265	″ -272	″	0.0027 ″
C266	QFN41HJ-223	MY Cap	0.022 50 V EG only
C267	″ -473	″	0.047 ″ ″
L201	—	—	
L202	PU53223-101G	Peaking Coil	100 μH
L203	″ -101G	″	100 μH
L204	PU53607-822	″	8.2 mH
L205	PU53618-101F	″	100 μH
L206	″ -821JF	″	820 μH
L207	PU54710-222	Coil	2.2 mH
L208	PU53223-271JG	Peaking Coil	270 μH
L209	″ -150JG	″	15 μH
L210	″ -101G	″	100 μH
L211	″ -101G	″	100 μH EG only
L212	PU53607-562	″	5.6 mH ″
L213	PU49057	LC Block	″
LPF201	PU54988	Low Pass Filter	
LPF202	PU54408-2	″	
BPF201	PU54410-2	Band Pass Filter	
BPF202	PU54409-2	″	
EQ201	PU54404	Equalizer	
CF201	PU56983	Ceramic Filter	EG only
DL201	PU57015	2H Comb Filter	
IB201	PU35238-002	Inline Block	
IB202	″ -003	″	
IB203	″ -009	″	
IB204	″ -005	″	
X201	PU31449-2	Crystal	
X202	PU57254	Crystal Osc.	

Symbol No.	Part No.	Part Name	Description
[Switching regulator section]			
IC401	AN6913	Integrated Circuit	or TA75393S
IC402	M5236L	"	
Q401	2SA1282AF	Transistor	
Q402	"	"	
Q403	"	"	
D401	11DQ04	Diode	
D402	"	"	
D403	LTZ-R15	"	
D404	1SS133	"	
D405	RD8.2EB2	Zener Diode	
R401	QRD161J-331	CR	330 1/6 W
R402	" -122	"	1.2 K "
R403	" -472	"	4.7 K "
R404	" -123	"	12 K "
R405	QVZ3531-103	VR	10 K
R406	QRD161J-822	CR	8.2 K 1/6 W
R407	" -332	"	3.3 K "
R408	QVZ3531-102	VR	1 K
R409	QRD161J-122	CR	1.2 K 1/6 W
R410	" -331	"	330 "
R411	" -122	"	1.2 K "
R412	" -273	"	27 K "
R413	" -472	"	4.7 K "
R414	" -104	"	100 K "
R415	" -104	"	100 K "
R416	" -0R0	"	0 "
R417	" -221	"	220 "
C401	QET41CM-476	E Cap	47 16 V
C402	QEC81CM-476	"	47 "
C403	QEM41AK-107	"	100 10 V
C404	QET41AM-476	"	47 "
C405	QCS31HJ-560	C Cap	56 P 50 V
C406	QEK51CM-106	E Cap	10 16 V
C407	QCS31HJ-560	C Cap	56 P 50 V
C408	QET41CM-476	E Cap	47 16 V
L401	PU56181-470	Choke Coil	47 μH
L402	PU55811-221	"	220 μH
L403	" -391	"	390 μH
CP401	ICP-F20	IC Protector	

Symbol No.	Part No.	Part Name	Description
CN 1	PU56259-12	Cap. Housing	
CN 2	" -12	"	
CN 3	" -12	"	
CN 4	PU54537-6	"	
CN 5	" -6	"	
CN 6	PU56259-8	"	
CN 7	PU56543-7	Board HSG Ass'y	
CN 8	PU56259-20	Cap. Housing	
CN 9	" -12	"	
CN10	PU56554	Camera Connector	
CN11	PU54537-10	Cap. Housing	
CN12	" -7	"	
CN13	" -2	"	
CN14	PU56259-12	"	

6.2.3 Servo board ass'y 0 3 ...... PU21817B

Symbol No.	Part No.	Part Name	Description
IC 1	BAF6305-T1	Flat IC	
IC 2	UPD4030BG-T2	"	
IC 3	M50767-604P	Integrated Circuit	
IC 4	HA11780MP	Flat IC	
IC 5	BA6302AF-T1	"	
IC 6	UPD4066BG-T2	"	
IC 7	BA833F	"	
IC 8	BA6328F-T1	"	
IC 9	UPC277G-T2	"	or UPC277G2-T2
IC10	BA6302AF-T1	"	
IC11	UPC451G-T1	"	or UPC451G2-T1
Q 1	DTC124KT-96	Chip Transistor	or UN2212-TX
Q 2	–	–	
Q 3	–	–	
Q 4	DTA124KT-97	Chip Transistor	or UN2112-TW
Q 5	2SA1037KT-96R,S	"	or 2SB709-TX
Q 6	2SC2412KT-96R,S	"	or 2SD601-TX
Q 7	" -96R,S	"	or "
Q 8	DTA124KT-97	"	or UN2112-TW
Q 9	2SA1037KT-96R,S	"	or 2SB709-TX
Q10	2SC2412KT-97R,S	"	or 2SD601-TW
Q11	2SA1037KT-97R,S	"	or 2SB709-TW
D 1	–	–	
D 2	DA204KT-96	Chip Diode	
D 3	" -97	"	
D 4	" -96	"	
D 5	DAN202KT-96	"	or MA151WK-TX
D 6	DA204KT-97	"	
D 7	DAP202KT-96	"	or MA151WA-TX
D 8	DA204KT-97	"	
D 9	" -97	"	
D10	–	–	
D11	–	–	
D12	1SS133	Diode	
R 1	QRS188J-103YN	Chip R	10 K 1/8 W
R 2	" -105YN	"	1 M "
R 3	" -223YN	"	22 K "
R 4	" -102YN	"	1 K "
R 5	" -102YN	"	1 K "
R 6	" -684YN	"	680 K "
R 7	" -683YN	"	68 K "
R 8	" -103YN	"	10 K "
R 9	" -103YN	"	10 K "
R10	" -103YN	"	10 K "
R11	" -103YN	"	10 K "
R12	" -103YN	"	10 K "
R13	–	–	
R14	–	–	
R15	QVZ3531-473	VR	47 K

Symbol No.	Part No.	Part Name	Description
R16	QRS188J-823YN	Chip R	82 K 1/8 W
R17	" -823YN	"	82 K "
R18	" -272YN	"	2.7 K "
R19	" -334YN	"	330 K "
R20	" -333YN	"	33 K "
R21	" -472YN	"	4.7 K "
R22	–	–	
R23	QRS188J-103YN	Chip R	10 K 1/8 W
R24	" -103YN	"	10 K "
R25	–	–	
R26	–	–	
R27	–	–	
R28	QVZ3531-474	VR	470 K
R29	QRS188J-394YN	Chip R	390 K 1/8 W
R30	" -103YN	"	10 K "
R31	" -334YN	"	330 K "
R32	" -104YN	"	100 K "
R33	" -224YN	"	220 K "
R34	" -473YN	"	47 K "
R35	" -102YN	"	1 K "
R36	PU56289-504	VR	500 K
R37	QRS188J-153YN	Chip R	15 K 1/8 W
R38	QVZ3531-103	VR	10 K
R39	QRS188J-103YN	Chip R	10 K 1/8 W
R40	" -824YN	"	820 K "
R41	" -105YN	"	1 M "
R42	" -221YN	"	220 "
R43	" -394YN	"	390 K "
R44	" -104YN	"	100 K "
R45	" -105YN	"	1 M "
R46	" -473YN	"	47 K "
R47	QVZ3531-104	VR	100 K
R48	QRS188J-824YN	Chip R	820 K 1/8 W
R49	" -104YN	"	100 K "
R50	" -333YN	"	33 K "
R51	" -333YN	"	33 K "
R52	" -103YN	"	10 K "
R53	" -103YN	"	10 K "
R54	" -333YN	"	33 K "
R55	" -222YN	"	2.2 K "
R56	" -222YN	"	2.2 K "
R57	" -222YN	"	2.2 K "
R58	" -473YN	"	47 K "
R59	QVZ3531-333	VR	33 K
R60	QRS188J-184YN	Chip R	180 K 1/8 W
R61	" -334YN	"	330 K "
R62	" -333YN	"	33 K "
R63	" -103YN	"	10 K "
R64	" -103YN	"	10 K "
R65	" -104YN	"	100 K "
R66	" -105YN	"	1 M "
R67	" -103YN	"	10 K "
R68	" -224YN	"	220 K "
R69	QVZ3531-104	VR	100 K
R70	QRS188J-104YN	Chip R	100 K 1/8 W
R71	" -103YN	"	10 K "
R72	" -682YN	"	6.8 K "
R73	" -564YN	"	560 K "
R74	" -472YN	"	4.7 K "
R75	" -563YN	"	56 K "
R76	" -103YN	"	10 K "
R77	" -684YN	"	680 K "
R78	" -683YN	"	68 K "
R79	" -103YN	"	10 K "
R80	" -105YN	"	1 M "

Symbol No.	Part No.	Part Name	Description
R81	QRS188J-104YN	Chip R	100 K 1/8 W
R82	" -103YN	"	10 K "
R83	" -103YN	"	10 K "
R84	" -103YN	"	10 K "
R85	" -474YN	"	470 K "
R86	–	–	
R87	–	–	
R88	QRS188J-103YN	Chip R	10 K 1/8 W
R89	" -103YN	"	10 K "
R90	" -104YN	"	100 K "
R91	–	–	
R92	–	–	
R93	QVZ3531-474	VR	470 K
R94	QRS188J-104YN	Chip R	100 K 1/8 W
R95	QVZ3531-474	VR	470 K
R96	QRS188J-104YN	Chip R	100 K 1/8 W
R97	QVZ3531-473	VR	47 K
R98	QRS188J-224YN	Chip R	220 K 1/8 W
R99	" -224YN	"	220 K "
R100	" -103YN	"	10 K "
R101	QVZ3531-224	VR	220 K
R102	QRS188J-473YN	Chip R	47 K 1/8 W
R103	QVZ3531-224	VR	220 K
R104	QRS188J-103YN	Chip R	10 K 1/8 W
R105	" -105YN	"	1 M "
R106	" -103YN	"	10 K "
R107	" -564YN	"	560 K "
R108	" -392YN	"	3.9 K "
R109	–	–	
R110	QRS188J-223YN	Chip R	22 K 1/8 W
R111	" -223YN	"	22 K "
R112	" -223YN	"	22 K "
R113	" -223YN	"	22 K "
R114	" -223YN	"	22 K "
R115	–	–	
R116	QRS188J-223YN	Chip R	22 K 1/8 W
R117	" -223YN	"	22 K "
R118	" -223YN	"	22 K "
R119	" -223YN	"	22 K "
R120	" -562YN	"	5.6 K "
R121	ERT-D2FHL103S	Thermistor	
R122	QRS188J-334YN	Chip R	330 K 1/8 W
R123	QRD161J-472	CR	4.7 K 1/6 W
R124	" -103	"	10 K "
R125	" -223	"	22 K "
C 1	QEK41HM-105	E Cap	1 50 V
C 2	QCY81HK-103ZL	Chip Cap	0.01 "
C 3	QCS81HJ-221ZL	"	220 P "
C 4	QEK41AM-476	E Cap	47 10 V
C 5	" -226	"	22 "
C 6	QCY81HK-102ZL	Chip Cap	0.001 50 V
C 7	QER41AM-476	E Cap	47 10 V
C 8	QCS81HJ-101ZL	Chip Cap	100 P 50 V
C 9	QER41AM-476	E Cap	47 10 V
C10	QCY81HK-103ZL	Chip Cap	0.01 50 V

Symbol No.	Part No.	Part Name	Description
C11	QFN41HJ-223	MY Cap	0.022 50 V
C12	QCY81HK-103ZL	Chip Cap	0.01 "
C13	" -472ZL	"	0.0047 "
C14	QER41AM-226	E Cap	22 10 V
C15	QER41HM-105	"	1 50 V
C16	QER41AM-226	"	22 10 V
C17	QFZ9011-124	MY Cap	0.12 63 V
C18	" -104	"	0.1 "
C19	QEP41HM-105	NP Cap	1 50 V
C20	QCY81HK-102ZL	Chip Cap	0.001 "
C21	QCS81HJ-331ZL	"	330 P "
C22	QCY81EK-333ZL	"	0.033 25 V
C23	QFN41HJ-273	MY Cap	0.027 50 V
C24	QFZ9011-104	"	0.1 63 V
C25	" -124	"	0.12 "
C26	QEK41AM-226	E Cap	22 10 V
C27	QFZ9011-104	MY Cap	0.1 63 V
C28	QCY81HK-102ZL	Chip Cap	0.001 50 V
C29	" -102ZL	"	0.001 "
C30	QFN41HJ-123	MY Cap	0.012 "
C31	QCS81HJ-331ZL	Chip Cap	330 P "
C32	QCY81EK-333ZL	"	0.033 25 V
C33	QFN41HJ-273	MY Cap	0.027 50 V
C34	QEL60JM-226G	E Cap	22 6.3 V
C35	" -226G	"	22 "
C36	QCY81EK-563ZL	Chip Cap	0.056 25 V
C37	" -563ZL	"	0.056 "
C38	QFP42AJ-102	PP Cap	0.001 100 V
C39	–	–	
C40	QCY81HK-102ZL	Chip Cap	0.001 50 V
C41	QCS81HJ-820ZL	"	82 P "
C42	QER41AM-226	E Cap	22 10 V
C43	QER41HM-474	"	0.47 50 V
C44	–	–	
C45	QEF81CM-105W	Chip T Cap	1 16 V
C46	–	–	
C47	QFP42AJ-272	PP Cap	0.0027 100 V
C48	QCY81HK-103ZL	Chip Cap	0.01 50 V
C49	" -103ZL	"	0.01 "
C50	QCS81HJ-101ZL	"	100 P "
C51	QER41AM-226	E Cap	22 10 V
C52	QCY81EK-223ZL	Chip Cap	0.022 25 V
C53	QER41AM-226	E Cap	22 10 V
C54	QEP41AM-106	NP Cap	10 "
C55	QFN41HJ-823	MY Cap	0.082 50 V
C56	QEP41HM-474	NP Cap	0.47 "
C57	" -105	"	1 "
C58	QEK41AM-226	E Cap	22 10 V
C59	–	–	
C60	QFN41HK-682	MY Cap	0.0068 50 V
C61	" -682	"	0.0068 "
C62	QCY81HK-103ZL	Chip Cap	0.01 "
C63	QEK41CM-106	E Cap	10 16 V
C64	QCY81HK-102ZL	Chip Cap	0.001 50 V
C65	" -102ZL	"	0.001 "
C66	" -122ZL	"	0.0012 "
C67	" -682ZL	"	0.0068 "
C68	QEK40JM-107	E Cap	100 6.3 V
C69	QFN41HK-222	MY Cap	0.0022 50 V
C70	QCY81HK-102ZL	Chip Cap	0.001 "
C71	" -102ZL	"	0.001 "
C72	QER41CM-106	E Cap	10 16 V
C73	QCS11HK-471	C Cap	470 P 50 V

Symbol No.	Part No.	Part Name	Description
L 1	PU53223-101JG	Peaking Coil	100 μH
L 2	PU56181-330	Choke Coil	33 μH
X 1	PU47701	Crystal	32.768 kHz
CN 1	PU56258-20	Cap. Housing	
CN 2	" -12	"	
CN 3	PU53587-2	"	
CN 4	PU54537-6	"	
CN 5	" -2	"	
CN 6	PU56259-8	"	
CN 7	PU54537-2	"	
	PU56008	Test Pin	TP1, 3, 6, 7, 11, 21, 22, GND, FM
	PQ30241	Terminal Holder	
	PQ40759-1-2	Battery Terminal	

6.2.4 MDA board ass'y $\boxed{0}\boxed{4}$ PU57256B

Symbol No.	Part No.	Part Name	Description
IC 1	AN6671	Integrated Circuit	or AN6671K
Q 1	2SA1020O,Y	Transistor	
D 1	11DQ04	Diode	
R 1	QRD161J-332	CR	3.3 K 1/6 W
R 2	" -102	"	1 K "
R 3	" -102	"	1 K "
R 4	" -102	"	1 K "
R 5	" -223	"	22 K "
R 6	" -561	"	560 "
R 7	" -473	"	47 K "
R 8	" -333	"	33 K "
R 9	" -472	"	4.7 K "
R10	" -223	"	22 K "
R11	" -223	"	22 K "
C 1	QEK41CM-106	E Cap	10 16 V
C 2	QEK41HM-225	"	2.2 50 V
C 3	" -225	"	2.2 "
C 4	QFN41HJ-223	MY Cap	0.022 "
C 5	QEK41HM-225	E Cap	2.2 "
C 6	" -225	"	2.2 "
C 7	QEK41EM-336	"	33 25 V
C 8	QEM41EK-106	"	10 "
C 9	QET41EM-107	"	100 "
C10	QFN41HJ-333	MY Cap	0.033 50 V
L 1	PU55811-391	Coil	390 μH
L 2	PU49994-120	"	12 μH
CN 1	PU56258-8	Cap. Housing	
	PU56521	Shield Case (1)	
	PU56522	" (2)	
IB 1	PU35238-006	Inline Block	
TH 1	PU52108-2R2	Posistor	

6.2.5 Pre-amp board ass'y 06 ...... PU35361A

Symbol No.	Part No.	Part Name	Description
IC 1	HA11782	Integrated Circuit	
Q 1	2SC2712Y	Chip Transistor	
Q 2	"	"	
Q 3	"	"	
Q 4	"	"	
R 1	PU57457-682	VR	6.8
R 2	" -682	"	6.8
R 3	QRS188J-103	Chip R	10 K 1/8 W
R 4	" -103	"	10 K "
R 5	" -123	"	12 K "
R 6	" -123	"	12 K "
R 7	" -681	"	680 "
R 8	" -681	"	680 "
R 9	" -272	"	2.7 K "
R10	" -272	"	2.7 K "
R11	" -152	"	1.5 K "
R12	" -152	"	1.5 K "
R13	" -390	"	39 "
R14	" -390	"	39 "
R15	" -3R9	"	3.9 "
R16	" -3R9	"	3.9 "
R17	" -333	"	33 K "
C 1	QCY81EK-223ZL	C Cap	0.022 25 V
C 2	QER40JM-476	E Cap	47 6.3 V
C 3	QCY81EK-223ZL	C Cap	0.022 25 V
C 4	QER40JM-476	E Cap	47 6.3 V
C 5	QCY81EK-223ZL	C Cap	0.022 25 V
C 6	" -223ZL	"	0.022 "
C 7	" -223ZL	"	0.022 "
C 8	" -223ZL	"	0.022 "
C 9	" -223ZL	"	0.022 "
C10	" -223ZL	"	0.022 "
C11	" -223ZL	"	0.022 "
C12	" -223ZL	"	0.022 "
C13	PU57458-500	TR Cap	50 P
C14	" -500	"	50 P
C15	QCY81EK-223ZL	Chip Cap	0.022 25 V
C16	" -223ZL	"	0.022 "
C17	" -223ZL	"	0.022 "
C18	" -223ZL	"	0.022 "
C19	" -223ZL	"	0.022 "
C20	" -223ZL	"	0.022 "
C21	QER41HM-105	E Cap	1 50 V
C22	" -105	"	1 "
	PU56278	Test Pin	TP1, 2
L 1	PU53223-101G	Peaking Coil	100 μH
L 2	" -101G	"	100 μH
CN 1	PU56258-8	Cap. Housing	
	PU57459	Shield Case (1)	
	PU57460	" (2)	

6.2.6 Audio board ass'y 07 .... PU34674B

Symbol No.	Part No.	Part Name	Description
IC 1	AN3991K	Integrated Circuit	
IC 2	TA7361P	"	
IC 3	6VT02	"	
Q 1	–	–	
Q 2	–	–	
Q 3	2SD1330S,T	Transistor	
Q 4	–	–	
Q 5	DTC144F	D. Transistor	
Q 6	DTA124F	"	
Q 7	DTC144F	"	
Q 8	"	"	
Q 9	2SA1175H	Transistor	
Q10	2SC2787LF	"	
Q11	DTC144F	D. Transistor	
D 1	HZ11B2L	Zener Diode	
D 2	–	–	
D 3	1SS133	Diode	
R 1	QRD161J-222	CR	2.2 K 1/6 W
R 2	" -221	"	220 "
R 3	" -223	"	22 K "
R 4	" -393	"	39 K "
R 5	–	–	
R 6	–	–	
R 7	QRD161J-271	CR	270 1/6 W
R 8	–	–	
R 9	–	–	
R10	QRD161J-124	CR	120 K 1/6 W
R11	" -472	"	4.7 K "
R12	QVZ3531-222	VR	2.2 K
R13	QRD161J-103	CR	10 K 1/6 W
R14	" -102	"	1 K "
R15	" -562	"	5.6 K "
R16	" -103	"	10 K "
R17	QVZ3531-103	VR	10 K
R18	QRD161J-151	CR	150 1/6 W
R19	–	–	
R20	QRD161J-273	CR	27 K 1/6 W
R21	" -822	"	8.2 K "
R22	–	–	
R23	QRD161J-223	CR	22 K 1/6 W
R24	" -562	"	5.6 K "
R25	" -332	"	3.3 K "
R26	" -823	"	82 K "
R27	" -121	"	120 "
R28	" -223	"	22 K "
R29	" -102	"	1 K "
R30	" -0R0	"	0
R31	QVZ3531-333	VR	33 K
R32	QRD161J-393	CR	39 K 1/6 W
R33	–	–	
R34	QRD161J-181	CR	180 1/6 W
R35	–	–	
R36	QRD161J-103	CR	10 K 1/6 W
R37	–	–	
R38	QRD161J-332	CR	3.3 K 1/6 W

Symbol No.	Part No.	Part Name	Description
C 1	QFN31HJ-122Z	MY Cap	0.0012 50 V
C 2	QEK61HM-334GZ	E Cap	0.33 "
C 3	QEP41HM-335	NP Cap	3.3 "
C 4	QEK60JM-476Z	E Cap	47 6.3 V
C 5	—	—	
C 6	—	—	
C 7	QFN31HJ-681Z	MY Cap	680 P 50 V
C 8	QEL61HM-474G	LL Cap	0.47 "
C 9	QEL61CM-106G	"	10 16 V
C10	—	—	
C11	QFN31HJ-223Z	MY Cap	0.022 50 V
C12	—	—	
C13	QEP61AM-106GZ	NP Cap	10 10 V
C14	QEK41HM-335	E Cap	3.3 50 V
C15	QEK61HM-335G	"	3.3 "
C16	" -224G	"	0.22 "
C17	QFN31HJ-822Z	MY Cap	0.0082 "
C18	" -473Z	"	0.047 "
C19	—	—	
C20	QEK61HM-474GZ	E Cap	0.47 50 V
C21	QEU41AM-227	"	220 10 V
C22	QFN41HJ-471	MY Cap	470 P 50 V
C23	QEK61HM-335G	E Cap	3.3 "
C24	QEK41HM-225	"	2.2 "
C25	QEK41AM-226	"	22 10 V
C26	QEK40JM-336	"	33 6.3 V
C27	" -226	"	22 "
C28	QER61CM-106GZ	"	10 16 V
C29	QEK61CM-476	"	47 "
C30	—	—	
C31	QEK60JM-476Z	E Cap	47 6.3 V
C32	QFN31HJ-471Z	MY Cap	470 P 50 V
C33	QFP32AJ-273	PP Cap	0.027 100 V
C34	QEK40JM-476	E Cap	47 6.3 V
C35	QCS31HJ-121	C Cap	120 50 V
	PQ40936	Sub Frame	
	SDSA3008Z	Tap. Screw	
L 1	PU56366	L.P.F. Coil	
L 2	PU54710-392	Coil	3.9 mH
L 3	PU53617	Osc. Coil	
L 4	PU48530-471J	Peaking Coil	470 μH
CN 4	PU49215-3	Cap. Housing	
CN 5	" -3R	"	
IB 1	PU33106-058	In-Line Block	
	PU56008	Test Pin	TP1, 2
J001	PU56367	Jack Board Ass'y	

6.2.7 OSC. board ass'y $\boxed{0}\boxed{9}$ PU56534A-2

Symbol No.	Part No.	Part Name	Description
IC 1	3VT01	Integrated Circuit	
Q 1	DTA124F	Transistor	
Q 2	DTC144F	"	
R 1	QRD167J-393	CR	39 K 1/6 W
R 2	" -391	"	390 "
C 1	QER41EM-226	E Cap	22 25 V
C 2	QFN41HJ-393	MY Cap	0.039 50 V
L 1	PU53618-471JF	Coil	470 μH
CN 1	PU56535-7	Recept. Housing	
CN 2	PU53587-3	Cap. Housing	
CN 3	PU54537-2R	"	
CN 4	" -2	"	
	PU56008	Test Pin	TP2
	PU56567	Supporter	

JVC

SERVICE MANUAL

TUNER/ADAPTER

TU-S10EG/EK

SPECIFICATIONS (TU-S10EG/EK)

(TU-S10EG)

General
Power requirement : 220 V∿, 50/60 Hz
Power consumption : 29 W
Weight : 3.0 kg
Dimensions : 223(W) x 76.5(H) x 256(D) mm
Temperature
  Operating : 5°C to 40°C
  Storage : -20°C to 60°C

Tuner section
Channel coverage : VHF band I, 47 – 118 MHz
VHF band III, 118 – 300 MHz
UHF band IV/V, 470 – 862 MHz
Video line input : 0.5 to 2.0 Vp-p, 75 ohms unbalanced
Video line output : 1.0 Vp-p, 75 ohms
Audio line input : -20 dBs, 50 k-ohms, unbalanced
Audio line output : -6 dBs, 1 k-ohm, unbalanced
When combined with HR-S10EG

Timer section
Clock/timer indication : 24-hour fluorescent digital indication
Clock reference : Quartz controlled
Timer start setting : Within 2 weeks
Programming capacity: 8 programmes

AC power adapter/charger section
Rated output voltage : 12 V ⎓
Rated output current : Less than 1.3 A (adapter mode)
Battery pack to be charged : Exclusive Ni-Cad battery pack, NB-P4U/NB-P3U
Charging indicator : Provided

Provided accessories
Infrared remote control unit
"R6"-size battery x 2

Design and specifications subject to change without notice.

(TU-S10EK)

General
Power requirement : 220 V∿, 50/60 Hz
Power consumption : 29 W
Weight : 3.0 kg
Dimensions : 223(W) x 76.5(H) x 256(D) mm
Temperature
  Operating : 5°C to 40°C
  Storage : -20°C to 60°C

Tuner section
Channel coverage : UHF band IV/V, channels 21 – 69
Video line input : 0.5 to 2.0 Vp-p, 75 ohms unbalanced
Video line output : 1.0 Vp-p, 75 ohms
Audio line input : -20 dBs, 50 k-ohms, unbalanced
Audio line output : -6 dBs, 1 k-ohm, unbalanced
When combined with HR-S10EK

Timer section
Clock/timer indication : 24-hour fluorescent digital indication
Clock reference : Quartz controlled
Timer start setting : Within 2 weeks
Programming capacity: 8 programmes

AC power adapter/charger section
Rated output voltage : 12 V ⎓
Rated output current : Less than 1.3 A (adapter mode)
Battery pack to be charged : Exclusive Ni-Cad battery pack, NB-P4U/NB-P3U
Charging indicator : Provided

Provided accessories
Infrared remote control unit
"R6"-size battery x 2

E. & O. E. Design and specifications subject to change without notice.

TU-S10EG/EK

INSTRUCTIONS

Thank you for purchasing the JVC TU-S10EG/EK Tuner/Adapter. It is built using an advanced voltage synthesizer wide-band tuner with 32-channel storage capacity (EK: 16-channel storage). When combined with the matching HR-S10EG/EK Portable Video Cassette Recorder, the TU-S10EG/EK also functions as a power base to supply AC power to the recorder or charge the battery pack attached to the recorder. The built-in 14-day/8-event programmable timer lets you record TV programmes when you away. The infrared remote control unit not only controls the TU-S10EG/EK, but also the connected HR-S10EG/EK recorder.

To obtain the best performance and greatest utilisation from your TU-S10EG/EK, read this instruction booklet carefully and completely.

CONTENTS

Features 2
Precautions 2
Controls, indicators and connectors 3
Connecting and disconnecting the HR-S10EG/EK recorder and the TU-S10EG/EK tuner 8
Moisture condensation prevention 8
Connection 9
Clock setting 10
Pre-tuning the tuner 11
Recording a TV programme while watching it 13
Recording one TV programme while watching another 14
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Playing back a video cassette 19
Audio dubbing 20
Insert editing 21
Recording with a video camera 23
Charging the battery pack 23
Tape-to-tape editing 25
In case of difficulty 27
Specifications 28

WARNING:
TO PREVENT FIRE OR SHOCK HAZARD, DO NOT EXPOSE THIS APPLIANCE TO RAIN OR MOISTURE.

CAUTION
Dangerous voltage inside. Refer internal servicing to qualified service personnel. To prevent electric shock or fire hazard, remove the power cord from the AC outlet prior to connecting or disconnecting any signal lead or aerial.

MAINS POWER SWITCH
The mains switch is located on the rear connector panel. Setting this switch to OFF removes all applied power from the set including the timer clock. Switching on or off the tuner section is performed with the BETRIEB button of the HR-S10EG recorder.

NOTE:
The rating plate (serial number plate) and the safety caution are on the bottom of the unit.

CAUTION
When you are not using the TU-S10EG/EK for a long period of time, it is recommended that you disconnect the power cord from the AC outlet.

IMPORTANT (In the United Kingdom)
Mains Supply (240 V∿, 50 Hz only)

IMPORTANT

Do not make any connection to the Larger Terminal coded E or Green. The wires in the mains lead are coloured in accordance with following code:

Blue to N (Neutral) or Black
Brown to L (Live) or Red

If these colours do not correspond with the terminal identifications of your plug, connect as follows:
Blue wire to terminal coded N (Neutral) or coloured Black.
Brown wire to terminal coded L (Live) or coloured Red.
If in doubt – consult a competent electrician.
Note
We recommend that you should disconnect the AC cord from the outlet. (EK only)

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FEATURES

- A new, microprocessor-assisted timer that can perform multi-way programming for unattended recording up to 14 days in advance utilising 8 separate programmes.
- Voltage synthesizer wide-band tuner with 32-channel storage capacity. (EK: 16-channel)
- Simple, cable-less connection to the HR-S10EG/EK recorder with a single action.
- Infrared remote control unit that can control both the TU-S10EG/EK tuner and the HR-S10EG/EK recorder when they are connected.
- Quick charging function for the NB-P4U/NB-P3U rechargeable battery pack attached to the HR-S10EG/EK.
- Clock/timer memory hold system having a back-up time of about 60 minutes.
- Auto-scan tuning with channel up/down buttons.
- Channel lock mechanism is automatically engaged during recording.
- Serves as an AC power adapter for the HR-S10EG/EK recorder.
- Fluorescent tube display for indicating time and programmed timer recording data.
- Improved clock accuracy through use of a quartz oscillator.

PRECAUTIONS

- Prevent inflammables, water and metallic objects from entering the unit.
- Do not remodel or disassemble the unit. To do so is dangerous and damage may result.
- Do not damage the power cord as this could cause electrical shocks.
- Remove the AC power cord from the AC outlet when you are not using the unit for a long period.

> If malfunctioning occurs, discontinue using the unit immediately, unplug it from the AC outlet.

- Do not position the unit vertically or upside down.
- Do not subject the unit to shocks. Exercise special care while carrying it.
- Do not carry the unit while it remains attached to the recorder. Be sure to disconnect it from the recorder to avoid any possible danger.
- Avoid using the unit under the following conditions:
  - – extremely hot or cold places,
  - – places subject to excessive humidity or dust, and
  - – places subject to excessive vibrations.
- Do not block the ventilation openings.
- Do not place anything which might spill and cause trouble on the top cover of the unit.
- When there is lightning in the vicinity, unplug the power cord from the AC outlet.

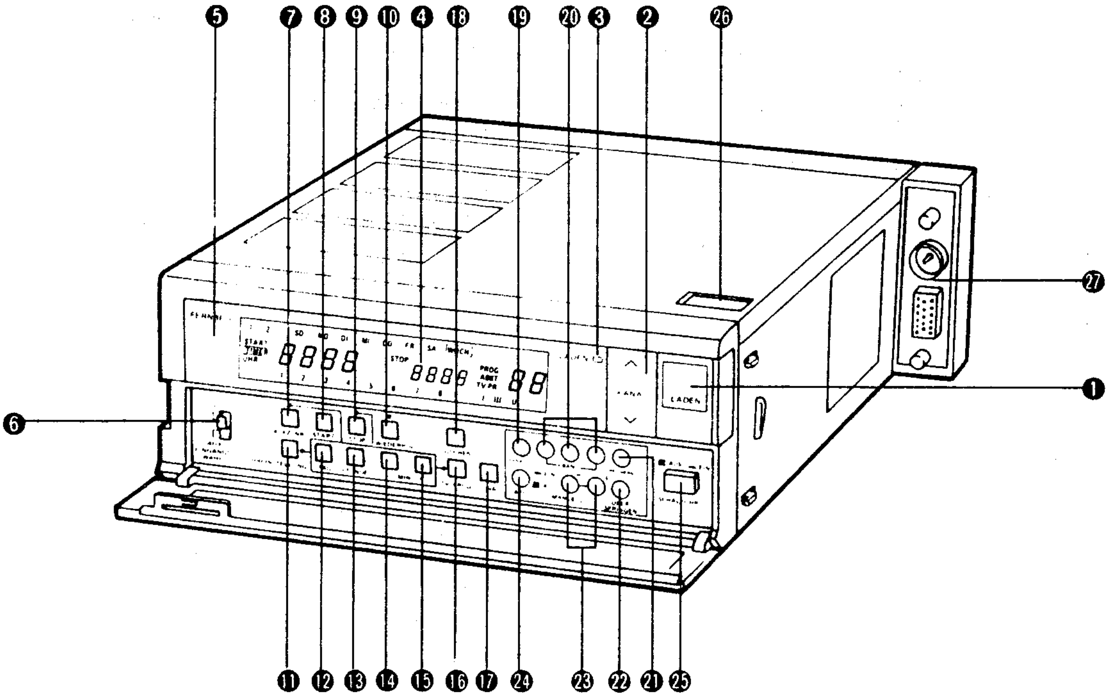
Power supply system

When the power cord of the TU-S10EG/EK is plugged into an AC outlet, and the rear panel MAIN POWER/NETZ switch is set to ON/EIN, the clock/timer section is powered. However, the tuner and AC adapter section cannot be switched on independently of the HR-S10EG/EK recorder. To power the tuner and AC adapter sections, connect the recorder to the tuner and press the recorder's POWER/BETRIEB button to ON. As long as the power cord of the tuner is plugged in and the rear panel MAIN POWER/NETZ switch is set to ON/EIN, with the recorder correctly connected to the tuner, both units can be switched on or off together by using the recorder's POWER/BETRIEB button or remote control unit's ON/OFF (AUS/EIN) buttons.

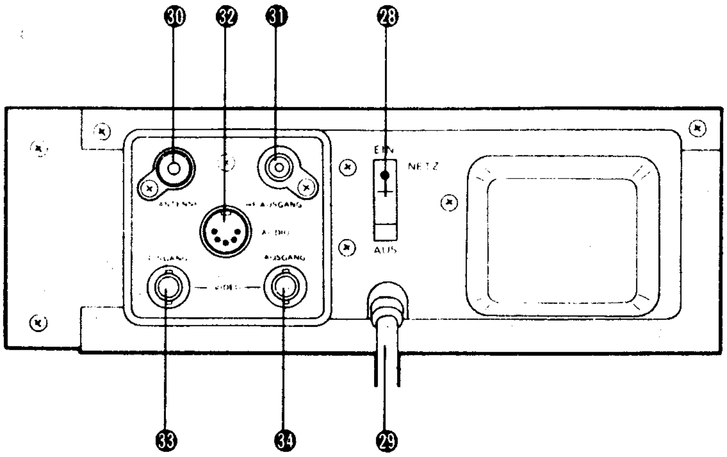
Maintenance

To clean the cabinet, wipe it with a soft cloth. Do not use thinner or benzine, as these may damage the surface finish of the cabinet or blur the timer display. If the cabinet becomes extremely dirty, first wipe with a soft cloth soaked in a diluted neutral cleaning agent and then apply a dry cloth.

CONTROLS, INDICATORS AND CONNECTORS


5
7
8
9
10
4
18
19
20
3
2
26
27
6
1
LADEN
11
12
13
14
15
16
17
24
23
22
21
25

Rear panel


30
32
31
28
EIN
NETZ
ANTENNE
HF-AUSGANG
AUDIO
EINGANG
AUSGANG
VIDEO
AUS
33
34
29

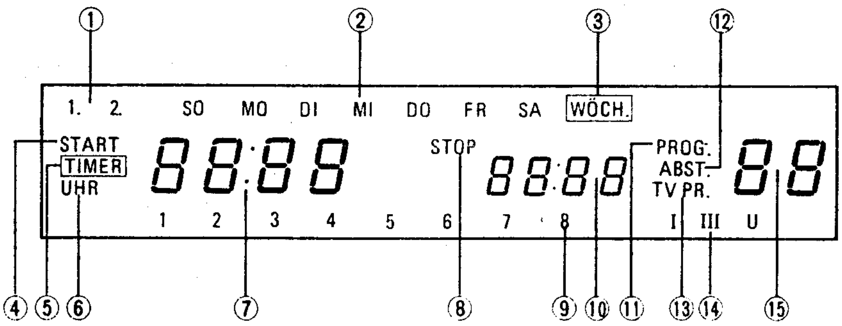
❶ CHARGE button (LADEN)
Press to charge the Ni-Cad battery pack attached to the rear of the recorder. The CHARGE/LADEN indicator lights when charging starts.

❷ CHANNEL button (KANAL)
Press to tune to preset stations; the "⋀" side for scanning in the direction of increasing channel numbers and the "⋁" side in the direction of decreasing channel numbers. The selected channel will appear in the channel display.

❸ CHARGE indicator (LADEN)
This LED lights when the CHARGE/LADEN button ❶ is pressed.

❹ Fluorescent display section

❹



① Week indicator
"1." or "2." illuminates to show the week for making preset recordings. "1." stands for the period within one week and "2." within the second week from setting.

② Day indicator
Illuminates both for continuous day indication and for day presetting for future recordings.

③ Repeat indicator (WÖCH.)
Illuminates when the REPEAT/WIEDERHOL. button ❿ is pressed to show that the entered data for timer recording will be retained for serial recordings.

④ START indicator
Flashes for switch-on time setting.

⑤ TIMER indicator
Illuminates when the timer button (TIMER/SCHALTUHR) ㉕ is pressed to ON/EIN (▬) to show that the recorder has been properly preset for timer recording.

⑥ CLOCK indicator (UHR)
Always illuminates except in the Programme Set mode.

⑦ Clock/Start time display

⑧ STOP indicator
Flashes for switch-off time setting.

⑨ Programme number indicator
Numerals 1 through 8 illuminate successively each time the PROGRAM/AUFZ. NR. button ❼ is pressed to show which programme is ready for entry.

⑩ Stop time display/Sweep indicator

⑪ PROG. indicator
Flashes to show that the channel is ready to be entered for timer recording.

⑫ Set indicator (ABST.)
Illuminates when the CH. SET/KANALEINST. button ⓳ is pressed for pre-tuning and flashes during sweep scanning.

⑬ Channel indicator (TV PR.)
Illuminates to show that the displayed channel is currently being received by the tuner.

⑭ I. III, U indicator (EK: U only)
Flashes when the corresponding tuning button (I, III, U) ⓴ is pressed, showing that sweep scanning of that particular frequency band is being performed. Also functions during manual tuning using the MANUELL "+" and "–" buttons.

⑮ Channel display
Numerals 1 through 32 (EK: 16) are successively displayed to show which channel is selected for recording, timer setting or for pre-tuning.

❺ Infrared beam receiving window (FERNBED.)

❻ Input select switch (EINGANGS-WAHL)

For selecting the recording input signal.

TV: To deliver signals received by the tuner.

AUX: (LINE) To deliver signals coming from the units connected to the rear panel VIDEO IN(EINGANG) connector and AUDIO socket.

If a camera is connected to the CAMERA/KAMERA connector of the recorder, all other inputs (except from the recorder's microphone jack) are switched off and the camera signal is recorded.

❼ Programme button (AUFZ. NR.)

Press this button when you want to preset the timer for unattended recording. The entire display will change to the Programme Set mode, with numeral 1 illuminated at the bottom of the display. This shows that programme memory No. 1 is ready to accept entries. To change the programme number, press this button until the number of the programme memory you want to use illuminates.

❽ START button

Press for setting the day and switch-on timer for automatic timer recording.

❾ STOP button

Press for setting the switch-off time for automatic timer recording.

❿ REPEAT button (WIEDERHOL.)

After you have entered all data for each programme for unattended recording, if you wish the entered data to be kept for serial recording, press this button.

⓫ CLOCK ADJUST button (UHREINSTELLUNG)

Hold this button pressed for clock setting.

⓬ DAY button (TAG)

Press until a desired day indication appears on the display for clock and timer settings.

⓭ HOUR button (STUNDE)

Press to obtain a desired hour indication for clock and timer settings.

⓮ MIN- button

Press to decrease the minute indication for clock and timer settings.

⓯ MIN+ button

Press to increase the minute indication for clock and timer settings.

⓰ CHANNEL button (TV. PROG.)

Press this button and then use the large CHANNEL/KANAL button above ❷ to obtain a desired channel indication on the display in the Programme Set mode.

⓱ CLOCK button (UHR)

Press this button to change the display from the Programme Set mode to the Clock mode.

⓲ CANCEL button (LÖSCHEN)

Press this button to cancel or "clear" the preset data.

⓳ CH SET button (KANALEINST.)

Press this button for pre-tuning the tuner to TV stations in your area. (See pages 11 and 12.)

⓴ AUTO tuning buttons (BAND I, III, U) (EK: U only)

Press one of the buttons corresponding to the band in which you want to perform tuning. Automatic sweep tuning is initiated by pressing the button and stops automatically when a TV station is captured.

㉑ STORE button (SPEICHERN)

Press to store the tuned-in station in memory.

㉒ SKIP button (ÜBERSPRINGEN)

Press to skip unused channels. (See page 12.)

㉓ MANUAL tuning buttons (MANUAL +/–)
For manual tuning to weaker broadcast signals. (See page 12.)

㉔ AFC button (EG only)
Set to ON/EIN to activate the built-in Automatic Frequency Control circuit for fine picture tuning. Normally leave it in the ON/EIN position.

㉕ TIMER button (SCHALTUHR)
Press to ON/EIN (▬) after you have preset the timer for unattended recording.

㉖ RELEASE button (FREIGABE)
To separate the recorder from the tuner, slide the recorder forward while pressing this RELEASE/FREIGABE button.

㉗ VTR connector base
Allows direct contact with the direct connector section of the recorder.

㉘ MAIN POWER switch (NETZ)
Setting this switch to ON/EIN applies mains power to the set. To switch off the set completely, set the MAIN POWER/NETZ switch to OFF/AUS. This switches off the timer/clock circuit and cancels all the preset programming data after the memory backup time (about 60 minutes) has elapsed. This also switches off the built-in aerial circuit so that the TV receiver connected to the TU-S10EG/EK will not be able to receive off-the-air TV programmes for good viewing condition. Normally set this MAIN POWER/NETZ switch to ON/EIN.

㉙ AC power cord
Connect to a 220 V∿, 50/60 Hz household outlet. (EG)
Connect to a 240 V∿, 50/60 Hz household outlet. (EK)

㉚ ANT IN terminal (ANTENNE)
Connect an aerial to this terminal.

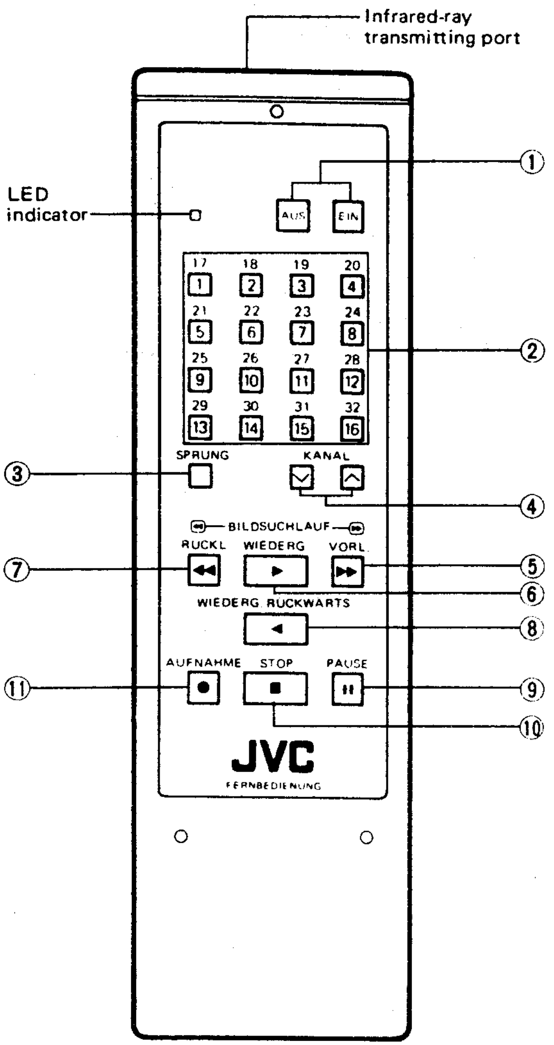
㉛ RF OUT connector (HF-AUSGANG)
Connect to the aerial terminal of a TV receiver through the aerial cable (provided with the HR-S10EG/EK recorder). The output is determined by the recorder's built-in RF converter. For adjustment of the RF output channel, refer to the instruction manual for the HR-S10EG/EK.

㉜ AUDIO input/output DIN socket
Connect a tape recorder or other audio sources for recording. Also audio signals being recorded or played back are available from the output terminals of this DIN socket. (EG)
Connect a tape recorder or other audio sources for recording. Also audio signals being recorded or played back are available from the output terminals of this DIN socket. The socket is of the 7-pin configuration, but 5-pin DIN connectors can also be plugged in. (EK)

㉝ VIDEO IN connector (VIDEO EINGANG)
Connect the video output of other video equipment such as another video tape recorder for recording video signals.

㉞ VIDEO OUT connector (VIDEO AUSGANG)
Video signals being recorded or played back are available from this connector.

Infrared remote control unit


Infrared-ray transmitting port
LED indicator
AUS
EIN
17
18
19
20
1
2
3
4
21
22
23
24
5
6
7
8
25
26
27
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31
32
13
14
15
16
SPRUNG
KANAL
BILDSUCHLAUF
RUCKL
WIEDERG
VORL
WIEDERG RUCKWARTS
AUFNAHME
STOP
PAUSE
JVC
FERNBEDIENUNG
①
②
③
④
⑤
⑥
⑦
⑧
⑨
⑩
⑪

(EG type)

Notes:

- Avoid violent shocks, especially take care not to drop the unit.
- Take care not to allow liquid to spill into the unit.
- Do not place heavy objects on the unit.
- Avoid leaving the unit in places subject to direct sunlight or extremely high temperatures.

The infrared remote control unit gives you operation control from your viewing position. It can control not only the TU-S10EG, but also the HR-S10EG through the TU-S10EG when they are connected in a single-piece system. The maximum operating distance is about 8 m.

① **Power ON/OFF buttons (EIN/AUS)**
To switch power on or off for the system.

② **Channel number buttons**
These buttons are used to call up the desired TV programme channel. (On the tuner the KANAL ∨/∧ button ❷ performs this same function.)
To call up channel 1, press button "1". For channel 2, press button "2" . . . and so on. To call up channels from 17 to 32, first press the button under the corresponding number and then press the SPRUNG button ③.
The channel number will be displayed on the channel display section of the fluorescent display.

③ **Shift button (SPRUNG)**
If you want to call up a channel between 17 and 32, first press the corresponding channel number button (shared with for channels between 1 and 16) and then press this button. By pressing this button, the selected channel is shifted by 16 channels.

④ **Channel select buttons (∨ / ∧) (KANAL)**

⑤ **FF/Shuttle search button (VORL./BILDSUCHLAUF)**

⑥ **Play button (WIEDERG.)**

⑦ **Rew/shuttle search button (RÜCKL./BILDSUCHLAUF)**

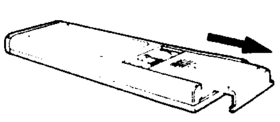
⑧ **Reverse play button (WIEDERG. RÜCKWÄRTS)**

⑨ **PAUSE button**

⑩ **STOP button**

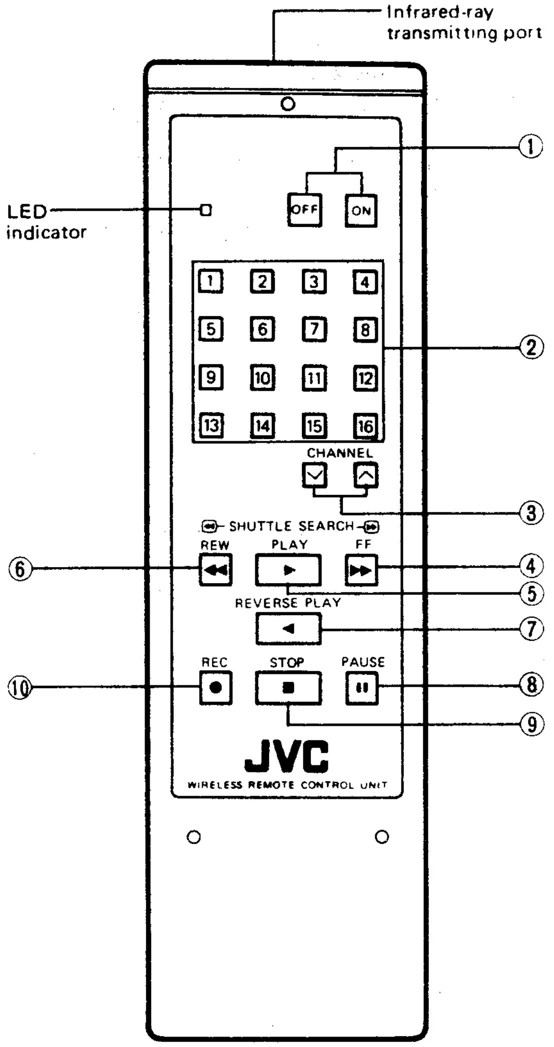
⑪ **Record button (AUFNAHME)**

Installing the batteries



1. Slide the battery compartment cover on the rear of the unit in the direction of the arrow (►).
2. Insert 2 "R6"-size batteries (provided) in the correct directions into the battery compartment.
3. Replace the cover.

Infrared remote control unit


Infrared-ray transmitting port
LED indicator
①
OFF
ON
②
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
CHANNEL
③
SHUTTLE SEARCH
REW
PLAY
FF
⑥
④
⑤
REVERSE PLAY
⑦
REC
STOP
PAUSE
⑩
⑧
⑨
JVC
WIRELESS REMOTE CONTROL UNIT

(EK type)

Notes:

- Avoid violent shocks, especially take care not to drop the unit.
- Take care not to allow liquid to spill into the unit.
- Do not place heavy objects on the unit.
- Avoid leaving the unit in places subject to direct sunlight or extremely high temperatures.

The infrared remote control unit gives you operation control from your viewing position. It can control not only the TU-S10EK, but also the HR-S10EK through the TU-S10EK when they are connected in a single-piece system. The maximum operating distance is about 8 m.

① **Power ON/OFF buttons**
To switch power on or off for the system.

② **Channel number buttons**
These buttons are used to call up the desired TV programme channel. (On the tuner the CHANNEL ∨/∧ button ❷ performs this same function.)
The channel number will be displayed on the channel display section of the fluorescent display.

③ **CHANNEL select buttons (∨/∧)**

④ **FF/SHUTTLE SEARCH button**

⑤ **PLAY button**

⑥ **REW/SHUTTLE SEARCH button**

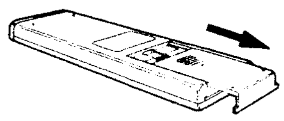
⑦ **REVERSE PLAY button**

⑧ **PAUSE button**

⑨ **STOP button**

⑩ **Record button (REC)**

Installing the batteries



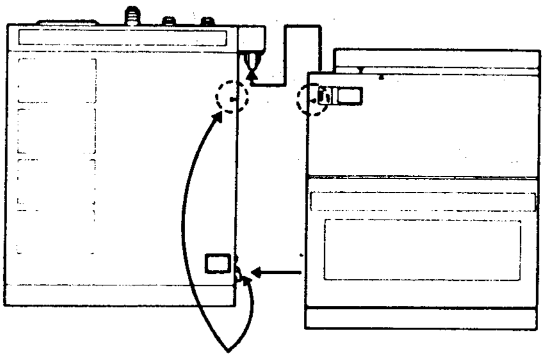
1. Slide the battery compartment cover on the rear of the unit in the direction of the arrow (►).
2. Insert 2 "R6"-size batteries (provided) in the correct directions into the battery compartment.
3. Replace the cover.

CONNECTING AND DISCONNECTING THE HR-S10EG/EK RECORDER AND THE TU-S10EG/EK TUNER

Make sure that the recorder's POWER/BETRIEB button is in its "OFF" position before connection or disconnection.

Connecting procedure

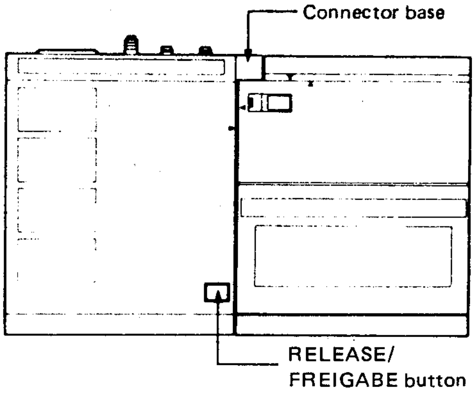
1. Place the recorder flush with the tuner so that the marks " ► " and " ◄ " on either unit align with each other and push the recorder rearward until a click is heard.
2. The recorder's direct connector section will plug into the tuner's connector base.



Align the marks and hook the pawls into the slots. Then push.

Disconnecting procedure

1. While pressing the tuner's RELEASE/FREIGABE button, pull the recorder straight forward.
2. Remove the recorder only after the tuner's connector base becomes fully visible.



CAUTION:

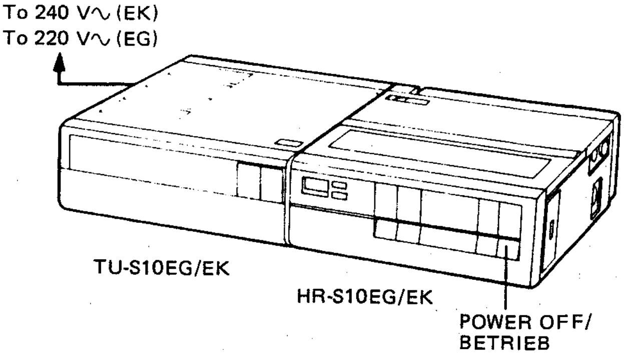
- Avoid carrying the two units in the connected state.
- When connecting or disconnecting the recorder, be careful not to apply pressure to its counter display.

MOISTURE CONDENSATION PREVENTION

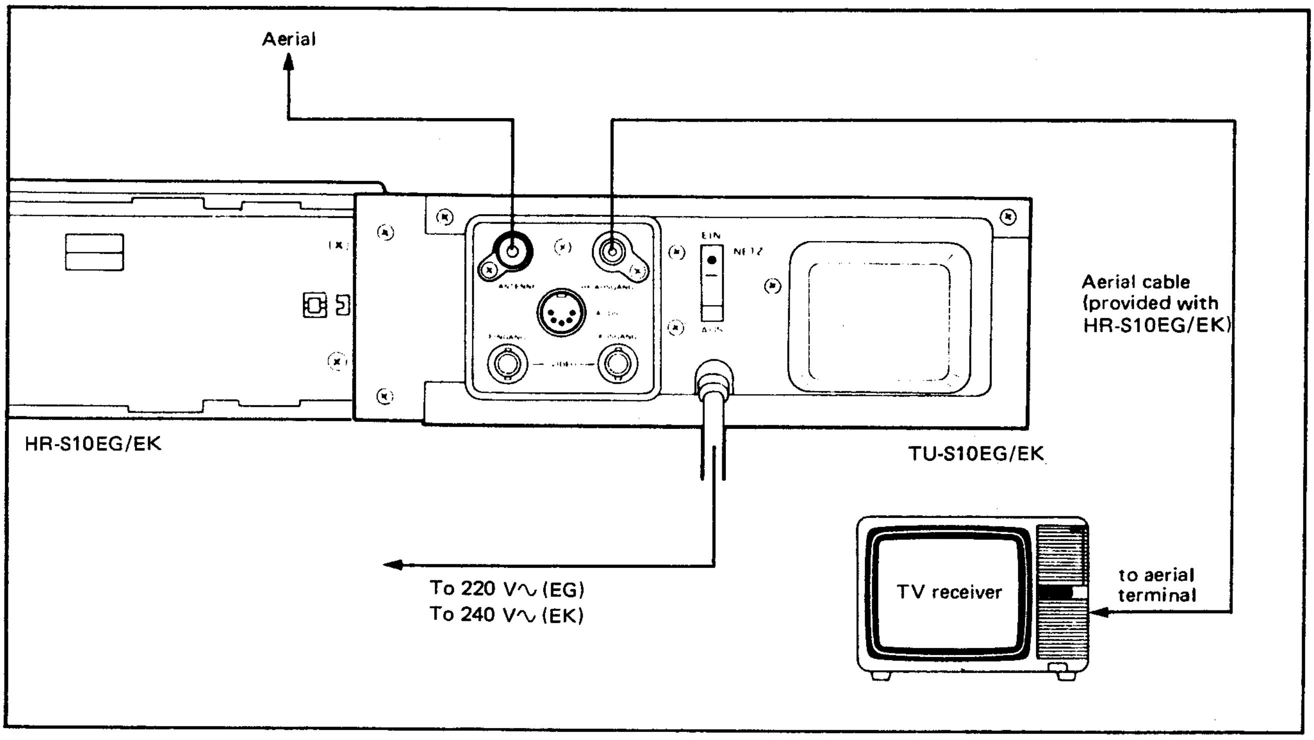
The TU-S10EG/EK incorporates a power supply for the moisture condensation prevention heater which is built in the HR-S10EG/EK recorder.

The TU-S10EG/EK delivers power to the recorder's heater only when the powe cord is plugged into an AC outlet, the tuner's MAIN POWER/NETZ switch is set to ON/EIN and the recorder's POWER/BETRIEB button is in the OFF position.

The moisture condensation prevention circuit consumes only a slight amount of power. However, if for some reason you are not using the recorder for a long period of time, it is advisable to set the MAIN POWER/NETZ switch to OFF/AUS.



CONNECTION



Procedure

1. Set the recorder's RF output channel adjustment screw correctly. (Refer to VIDEO CHANNEL SETTING on page 10 of the instruction manual for the HR-S10EG/EK.)
2. Remove the aerial cable from the TV receiver and reconnect to the TU-S10EG/EK as illustrated. The TU-S10EG/EK is then ready to receive off-air programmes.
3. Connect the TU-S10EG/EK to the TV receiver using the aerial cable (provided with HR-S10EG/EK). The TV receiver is then ready to receive TV broadcast programmes.

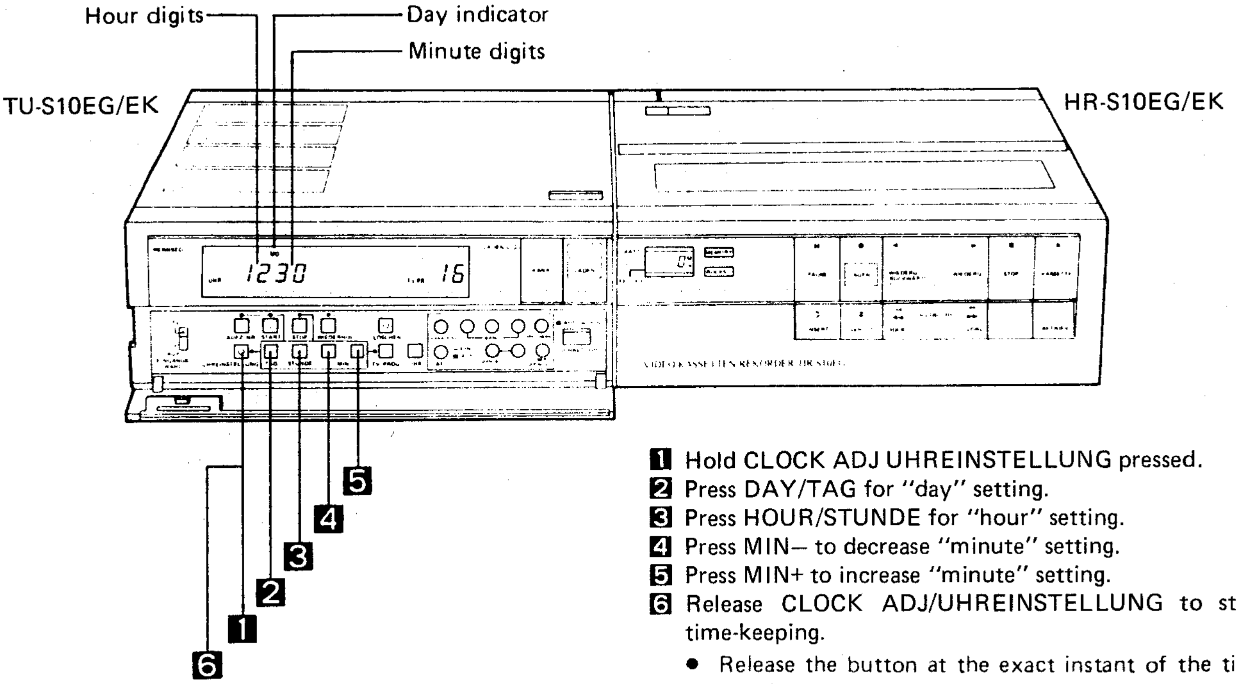
- In this state, the recorder can be connected or disconnected anytime at will. Before connecting or disconnecting the recorder from the tuner, make sure that the recorder's POWER/BETRIEB button is in the OFF position.
- When the recorder is connected to the tuner via their exclusive connectors, the combination records off-air programmes and the TV receiver accommodates video cassette playback.

CAUTION

Even when you are not using the TU-S10EG/EK, the rear panel MAIN POWER/NETZ switch should be set to ON/EIN in order to be able to view TV broadcast programmes with the illustrated connection.

CLOCK SETTING

Plug the TU-S10EG/EK into an AC outlet and set the rear panel MAIN POWER/NETZ switch to ON/EIN. The display shows a flashing 0:00.

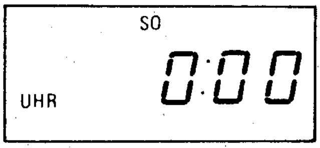


1. Hold CLOCK ADJ UHREINSTELLUNG pressed.
2. Press DAY/TAG for "day" setting.
3. Press HOUR/STUNDE for "hour" setting.
4. Press MIN– to decrease "minute" setting.
5. Press MIN+ to increase "minute" setting.
6. Release CLOCK ADJ/UHREINSTELLUNG to start time-keeping.
   - Release the button at the exact instant of the time signal, and the clock will be set accurately to the present time.

Notes:

- Holding the DAY/TAG, HOUR/STUNDE, MIN+ and MIN– buttons pressed continuously advances the corresponding indication automatically. Pressing either of them once advances the indication in single increments only.
- Any sequence of setting the day, hour and minute is possible.

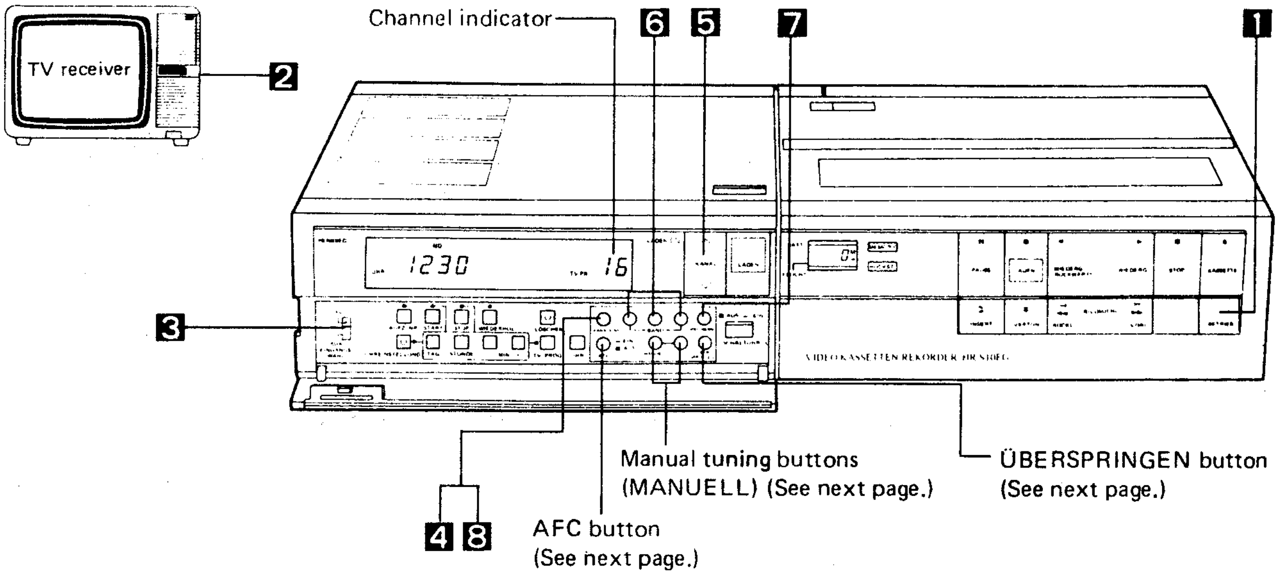
Power failure indicator



The clock display may reset to 0:00 and start to flicker fast. This is not a malfunctioning of the clock, but it indicates that there has been a power failure in excess of one hour. Re-adjusting the time restores the normal condition of the clock display.

- If the period of power outage is within about 60 minutes, correct time-keeping continues when power is reapplied.
- During this 60-minute period, the built-in memory back-up capacitor maintains time-keeping and preset timer memory, though the display blacks out.

PRE-TUNING THE TUNER

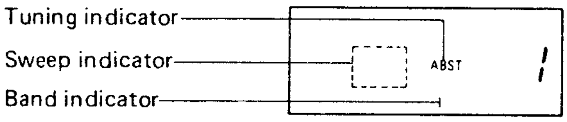

Channel indicator
6
5
7
1
TV receiver
2
1230
16
3
Manual tuning buttons
(MANUELL) (See next page.)
ÜBERSPRINGEN button
(See next page.)
4
8
AFC button
(See next page.)

1 Press BETRIEB.

2 Switch on the TV receiver.
Adjust the TV receiver's channel to your video channel. (For video channel setting, refer to the instruction manual for the HR-S10EG/EK.

3 Set to TV.

4 Press CH. SET/KANALEINST.
The following indication will appear on the right position of the display.


Tuning indicator
Sweep indicator
Band indicator
ABST
1

5 Specify the channel you wish to preset.

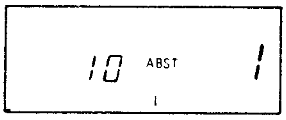
6 Press one of the automatic tuning buttons. (EG)
Press "I" when tuning in to VHF channels E2 – E4, S21 – S23, S1 – S2.
Press "III" when tuning in to VHF channels S3 – S10, E5 – E12, S11 – S20.
Press "U" when tuning in to UHF channels 21 through 69.

- Pressing the tuning button initiates automatic scanning.
- The ABST. and "I", "III" or "U" indicators will blink as the auto-scanning process proceeds.

6 Press the "AUTO U" button. (EK)

- Pressing the "AUTO U" button initiates automatic scanning.
- The SET and "U" indicators will blink as the auto-scanning process proceeds.

- The last 2 digits of the 4-digit display on the right functions as a sweep indicator, changing from 0 to 10 to give a rough reference of where tuning in the corresponding band is being performed.



- When any broadcast signal is detected, sweeping will automatically stop and the band indicator will remain lit.

7 Press STORE/SPREICHERN.

- The ABST. indicator stops blinking.
- This permits the tuned-in station to be memorised so that you can call up the same station at any time by simply pressing the KANAL "∨" or "∧" button to call up the corresponding channel number on the channel display.

CAUTION

- Proceed to next step after making sure that the SET/ABST. indicator changes from blinking to lighting.

8 After completing pre-tuning for all channels, press CH. SET/KANALEINST. to canal the pre-tuning mode.

IMPORTANT INFORMATION ON PRE-TUNING

Additional information on the tuning procedure

- If no command is given for about 60 seconds after the CH. SET/KANALEINST. button has been pressed, the channel display will return to the original with the CH/TV PR. indicator illuminated.
- When specifying the channel you wish to preset, the CHANNEL/KANAL button can be pressed either repeatedly for changing the number in a single increment or continuously held for rapid automatic changing.
- When the band indicator (I, III or U) stops blinking in step 6, check to see if the received broadcast is your desired one or not. (EK has U only.)
- After step 7, change the channel number by pressing either side of the CHANNEL/KANAL button and repeat steps 6 and 7 to preset all necessary channels.
- If the picture is not clear after following all procedures above, perform fine tuning on your television.
- Distorted pictures or sound, will be recorded if fine tuning has not been properly performed. Exercise care with this adjustment since the recorded picture and sound cannot be adjusted later.

Manual tuning

- With automatic tuning being performed with the three automatic tuning buttons (I, III, U), only those stations which have a signal strength exceeding a certain level can be captured. (EK employs U only.)
- To tune in weaker signals, employ manual tuning.
- For manual tuning, first select the band with one of the automatic tuning buttons and then use either one of the MANUAL/MANUELL buttons. Automatic scanning will stop and scanning will be performed only while one of the MANUAL/MANUELL buttons is being pressed.
- When you capture a desired station, press the STORE/SPEICHERN button in the same manner as for automatic tuning and the tuned-in station will be memorised.

AFC button (EG only)

- Leave the button in the ON/EIN position.
- When the CH SET/KANALEINST. button is pressed to engage the Channel Set mode, the AFC circuit is automatically switched off regardless of the setting of the AFC button.
- However, if beats cannot be eliminated during manual tuning, press the AFC button to OFF/AUS. After manual tuning, be sure not to leave the AFC button in the OFF/AUS position.

Skipping unused channels

Though 32 channels (EK: 16) are available for presetting to desired TV channels, you may not need all 32 (EK: 16) channels. In such cases, unused channels can be skipped so that only preset channels will be called up by pressing either side of the CHANNEL/KANAL button. For this purpose, proceed as follows:

1) Press the CHANNEL/KALANEINST. button.
2) Call up the channel number that you wish to skip by pressing either side of the CHANNEL/KANAL button.
3) Press the SKIP/ÜBERSPRINGEN button.
    - This completes the procedure for skipping the corresponding channel number.
4) Call up another channel number that you wish to skip and repeat the same procedure above.
5) Press the CH. SET/KANALEINST. button to disengage this mode.

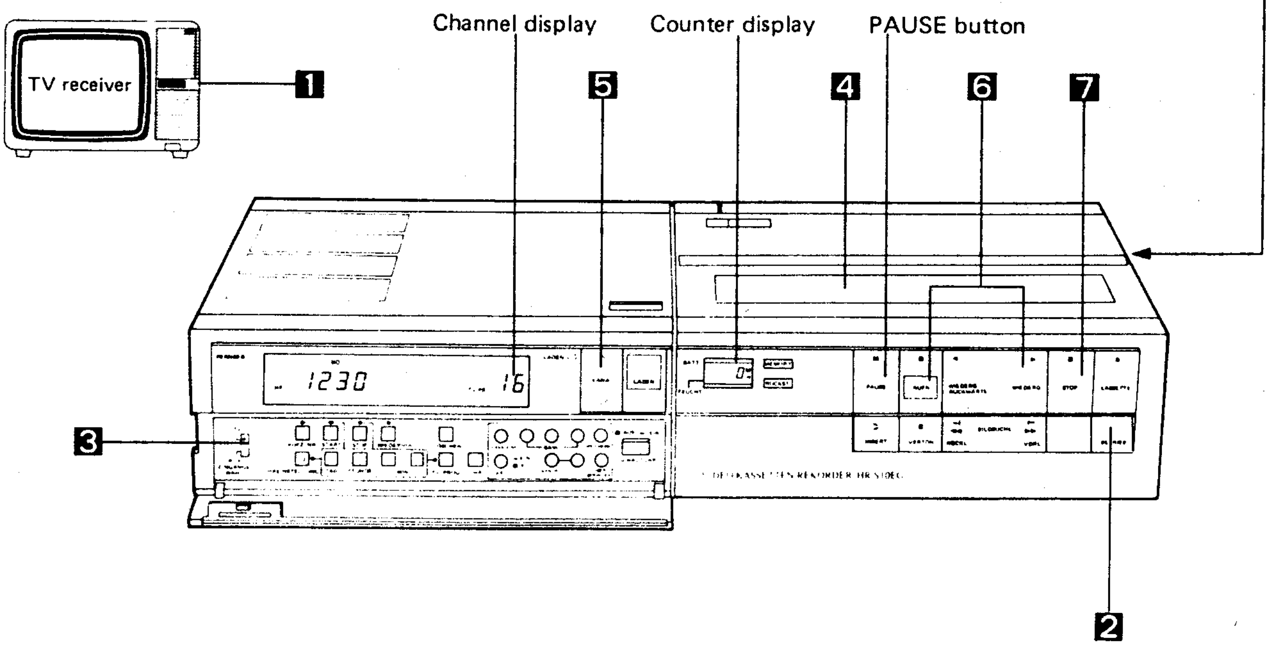
Notes:

- After this mode is disengaged, those skipped channel numbers will not appear on the channel display any more when the CHANNEL/KANAL button is pressed.
- In the Channel Set mode, all channel numbers including skipped ones are successively displayed when the CHANNEL/KANAL button is pressed.
- It is possible to restore the skipped channels for presetting to another TV channel whenever necessary. For this purpose, call up the corresponding channel number in the Channel Set mode and perform pretuning. Press the STORE/SPEICHERN button. Then, the new TV station channel is memorised and called up at any time with the CHANNEL/KANAL button.

RECORDING A TV PROGRAMME WHILE WATCHING IT

Basic concept: receive the desired TV programme with the tuner and operate the recorder for recording.

Do not leave a microphone or a camera connected.



1 Switch on the TV receiver.

- Adjust the TV receiver's channel to your video channel. (For video channel setting, refer to page 10 of the instruction manual for the HR-S10EG/EK.)

2 Press POWER/BETRIEB.

3 Set INPUT SELECT/EINGANGS-WAHL to TV.

4 Load a cassette.

5 Select the channel you wish to record.

6 Press REC/AUFN. and PLAY/WIEDERG. simultaneously to start recording.

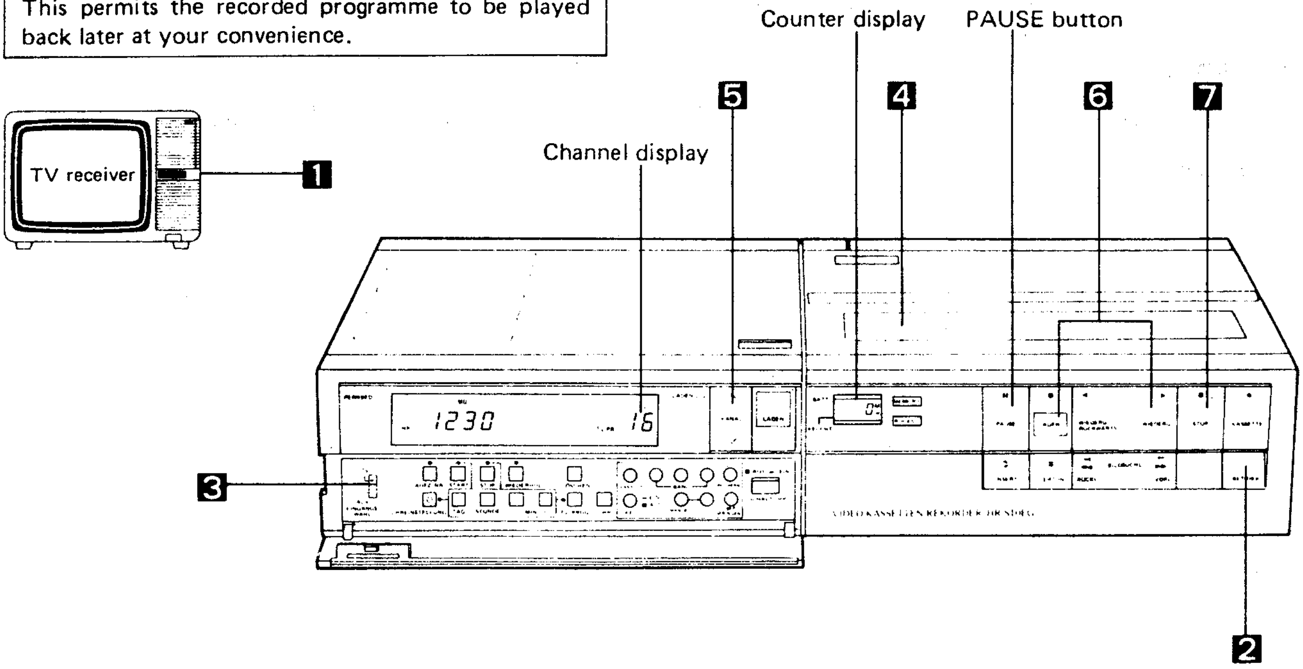
7 Press STOP at the end of the programme.

Notes:

- If there is part of the programme you don't want to record, press the recorder's PAUSE button. To cancel the Pause mode, press the PLAY/WIEDERG. button.
- The Pause mode is released automatically after about 5 minutes in order to prevent tape damage and the Stop mode is engaged.
- The tuner's automatic channel lock mechanism prevents the selected channel from being altered during recording. Therefore, if you wish to change the channel during recording, first engage the Pause mode and then select a different channel.

RECORDING ONE TV PROGRAMME WHILE WATCHING ANOTHER

A programme not being viewed can be recorded while you enjoy viewing another programme.
This permits the recorded programme to be played back later at your convenience.



1 Switch on the TV receiver.
- Adjust the TV receiver's channel to the one you wish to view.

2 Press POWER/BETRIEB.

3 Set INPUT SELECT/EINGANGS-WAHL to TV.

4 Load a cassette.

5 Select the channel you wish to record.

6 Press REC/AUFN. and PLAY/WIEDERG. simultaneously to start recording.

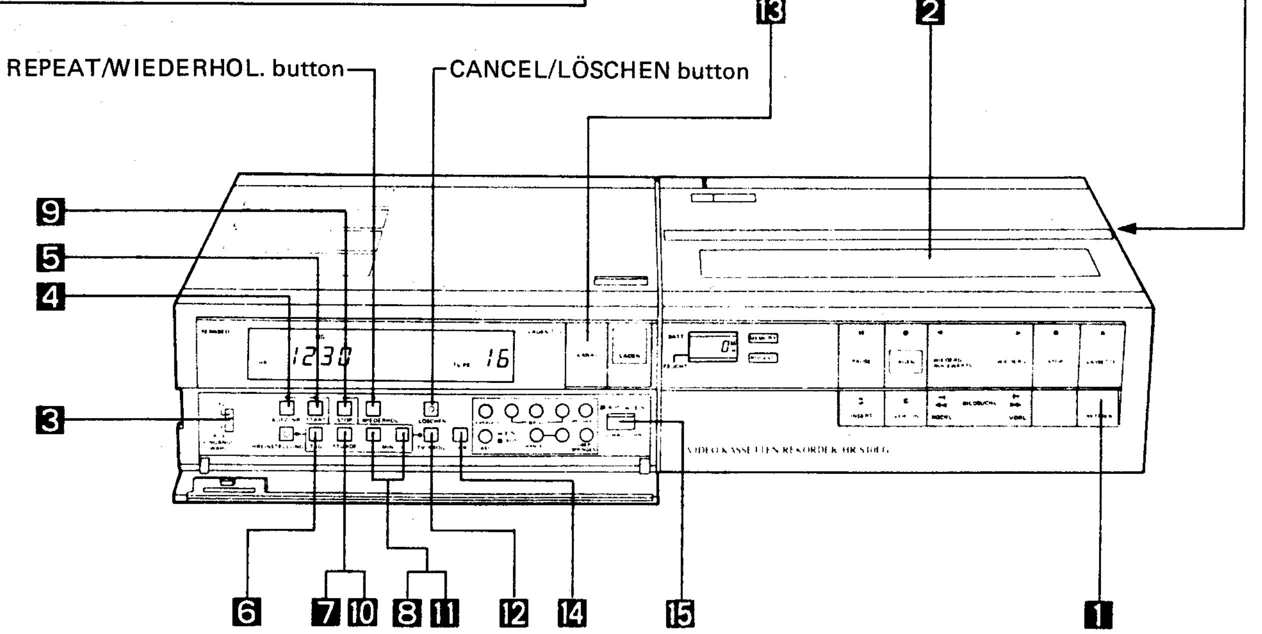
7 Press STOP at the end of the programme.

Notes:
The recording procedures are exactly the same as when recording a TV programme while watching it.
- Select the channel you wish to record with the tuner's channel selector.
- Select the channel you wish to view with the TV receiver's channel selector.

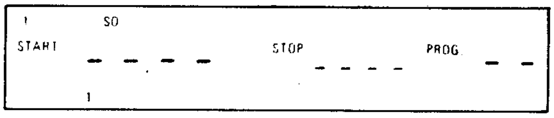
AUTOMATIC TIMER RECORDING

The 14-day/8-event programmable timer permits recording of preset channels on preset days, at preset times for preset lengths while you are away.

Do not leave a microphone or a camera connected.



1. Press POWER/BETRIEB.
2. Load a cassette.
3. Set INPUT SELECT/EINGANGS-WAHL to TV.
4. Press PROGRAM/AUFZ. NR.
   - The display will change to the Timer Set mode. You are ready to enter the data into No. 1 programme memory. If you want to change the programme number, press the PROGRAM/AUFZ. NR button a required number of times.



5. Press START for day and switch-on time setting.
   - The START indicator will flash.
6. Press DAY/TAG to obtain desired "day" indication.
7. Press HOUR/STUNDE to obtain desired "hour" indication.
8. Press MIN+ or MIN- to obtain desired "minute" indication.
9. Press STOP for switch-off time setting.
   - The STOP indicator will flash.
10. Press HOUR/STUNDE to obtain desired "hour" indication.
11. Press MIN+ or MIN– to obtain desired "minute" indication.
12. Press CHANNEL/TV. PROG. for setting the channel from which you want to record.
    - The PROG. indicator will flash.
13. Press CHANNEL/KANAL " ∧ " or " ∨ " to obtain desired channel indication.
14. Press CLOCK/UHR to change the display to the Clock mode.
    - If no command is entered within about 60 seconds, all displays will be restored automatically.
15. Press TIMER/SCHALTUHR to ON/EIN.
    - The TIMER indicator will light together with the numbers of the programmed memories.

Setting the START and STOP times

- It is not possible to set the START and STOP times unless the clock time has previously been set.
- Enter the data while the START or STOP indicator is flashing (about 60 seconds).
- Holding the DAY/TAG, HOUR/STUNDE, MIN+ and MIN– buttons pressed for more than 1 second continously advances the indication automatically. Pressing the buttons once advances the indication in single increments only.
- The sequence of day indications: from "1. SUN/SO" (first Sunday) to "1. SAT/SA" (first Saturday), then "2. SUN/SO" to "2. SUN/SA", and then an everyday indication.
- After setting the START time, when the STOP button is pressed, initial STOP time indication will be the same as the start time.
- Unless the START time has been properly set, STOP time setting is not possible.
- The STOP time can be set within 24 hours from the START time. If the hour setting for the STOP time runs into the following day, there is no need to set the day (the DAY/TAG button does not function when the STOP time mode is engaged). Recording will stop at the preset time on the following day, even though the day indication is not displayed.

Setting the channel

- Enter the data while the PROG. indicator is flashing (about 60 seconds).
- Setting the channel is independent from the START or STOP button. Therefore, it is possible to select the channel either before or after setting the START and STOP times.
- The currently tuned channel locks in the Programme Set mode and, when the display returns to the Clock mode, the locked channel is displayed.

Repeating the programmed data

- When you want to record a daily serial for one week, just obtain the everyday indication when setting the day.
- If you wish to hold the preset data in memory in order for recordings to be made repeatedly according to the same data (for example, at the same time on the same day every week), press the REPEAT/WIEDERHOL. button. The REPEAT/WÖCH. indicator will light.
- The combination of the everyday indication and REPEAT/WÖCH. indication means that recording will be repeated every day indefinitely.

Cancelling the preset data

- The preset programmes can be cancelled by pressing the CANCEL/LÖSCHEN button. For this purpose, first engage the Programme Set mode for the number you wish to cancel and then press the CANCEL/LÖSCHEN button.

Checking the programmed data

- Checking and re-programming can be performed anytime as long as the BETRIEB button on the HR-S10EG/EK is in the ON position (even when the TIMER/SCHALTUHR button has already been engaged in the ON/EIN position).
- While recording is actually taking place, the switch-off time can be changed. If the START button is pressed, the switch-on time is displayed, but the START indicator does not flash, indicating that changing of the switch-on time is not possible for that programme.
- While recording is actually taking place according to one preset programme, all other preset programmes can be checked or re-programmed.

TU-S10EG.

TIMER indicator

- When the TIMER/SCHALTUHR button is pressed to ON/EIN with a cassette loaded and the timer correctly programmed, the TIMER indicator on the display will light with the corresponding preset programme number(s) also lighting and the power is turned off.
- When you have preset several programmes at a time, confirm that all the preset programme numbers light together with the TIMER indicator when the TIMER/SCHALTUHR button is pressed. The programme whose number does not light has not been correctly preset (for instance, the channel has not been entered, the preset switch-on and switch-off times are the same, or no switch-off time has been entered). Recheck the programmed data.
- If all programmes have been wrongly preset, the TIMER indicator will flash for about 10 seconds when the TIMER/SCHALTUHR button is pressed, and then remains lit with no programme number lighting.
- If a cassette is not loaded or if its safety tab has been removed, the PLAY/WIEDERG. indicator on the recorder will blink when the TIMER/SCHALTUHR button is pressed.

Timer operation

- Tape loading starts 10 seconds before the preset switch-on time.
- During timer recording, the number of the programme that is presently operating will be flashing.
- After timer recording or when the end of the tape is reached during timer recording, the power is switched off.
- If a power failure should occur (and last longer than about 60 minutes), not only time-keeping stops (see page 10), but also all the preset data will be cancelled. A flashing 0:00 indicates this after power has been reapplied. In such cases, first correct the time indication and then re-enter the programming data.

Notes:

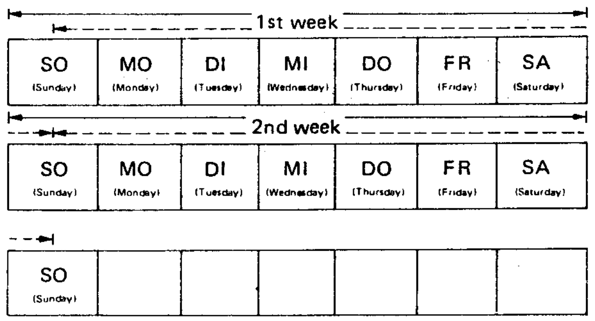
- After timer recording, press the TIMER/SCHALTUHR button to OFF/AUS.
- When power is applied after timer recording, the recorder enters the Recording Pause mode. To operate the recorder as usual, first press the STOP button.

FOR A BETTER UNDERSTANDING OF THE PROGRAMMABLE TIMER (TU-S10EG)

Two-week timer

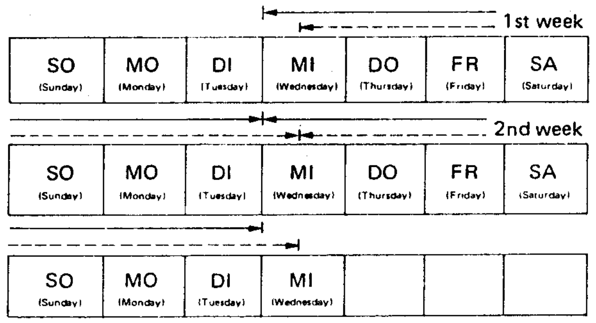
"Two-week" presetting capacity means that you can "reserve" recordings on any one of 14 days in advance including the day of setting.

If the current day of setting is Sunday:



- In this situation, there may be no possibility of confusion in setting the day.
- Namely, the "1. MO" is Monday of the current week and the "2. MO" is Monday of the next week. The same applies to other week days.
- Regarding Sunday, there are two different cases; one is that you are going to set the timer to a time before the current time of setting and the other is that the preset time is a time after the current time of setting.
- In the former case, the "1. SO" is the next Sunday and the "2. SO" is the Sunday after next.
- In the latter case, the "1. SO" is the current Sunday and the "2. SO" is Sunday of the next week.

If the current day of setting is Wednesday for example:



- Remember that the "1. MO", "1. DI" and so on . . . mean the first coming Monday, the first coming Tuesday, and so on, and not Monday of the current week.
- Similarly, the "2. MO", "2. DI" and so on . . . are the second coming Monday, the second coming Tuesday, and so on, and not Monday or Tuesday of the next week.
- If you are on Wednesday for example, and wish to record something on Tuesday of the next week, the preset data should be "1. DI". To record on Thursday of the next week, set "2. DO".
- Regarding Wednesday, the same as mentioned about Sunday on the left applies.

8-programme timer

"8-programme" presetting capacity means that you can have 8 separate programme entries which contain different programming data. Because of this capacity, you can even "reserve" 8 different TV programmes, either on the same day or on different days.

Each programme (No. 1 through No. 8) entry contains information on "TV programme channel number", "day", "start time", "stop time" and "either single or repeat".

Example of the contents of one programme entry:

Programme number	TV programme channel number	Day	Start time	Stop time	Repeat
2	12	1. MI (1st Wed.)	12:30	13:00	–

Variety of setting possibilities

- You can set for some day of the 1st week or the 2nd week.
- You can set for one day of every week by first setting that day of the 1st week and pressing the WIEDERHOL. button.
- You can set for one day of every week starting from the second week by first setting that day of the 2nd week and pressing the WIEDERHOL. button.
- You can set for all days. For this setting, obtain the indication "SO MO DI MI DO FR SA", and recordings will be repeated at the same time everyday for one week.
- You can set for all days week after week. For this setting, first obtain the indication as mentioned above and then press the WIEDERHOL. button. And recordings will be made everyday week after week.
- All the above applies for all 8 programme entries.

Programme priority

- If you have preset two programmes for the same day and the same switch-on time, the setting corresponding to the smaller programme number has priority.
- If two programmes have preset times which overlap, the earlier-started programme will be interrupted by the later one.

TIMER indicator

- When the TIMER button is pressed to ON with a cassette loaded and the timer correctly programmed, the TIMER indicator on the display will light with the corresponding preset programme number(s) also lighting and the power is turned off.
- When you have preset several programmes at a time, confirm that all the preset programme numbers light together with the TIMER indicator when the TIMER button is pressed. The programme whose number does not light has not been correctly preset (for instance, the channel has not been entered, the preset switch-on and switch-off times are the same, or no switch-off time has been entered). Recheck the programmed data.
- If all programmes have been wrongly preset, the TIMER indicator will flash for about 10 seconds when the TIMER button is pressed, and then remains lit with no programme number lighting.
- If a cassette is not loaded or if its safety tab has been removed, the PLAY indicator on the recorder will blink when the TIMER button is pressed.

Timer operation

- Tape loading starts 10 seconds before the preset switch-on time.
- During timer recording, the number of the programme that is presently operating will be flashing.
- After timer recording or when the end of the tape is reached during timer recording, the power is switched off.
- If a power failure should occur (and last longer than about 60 minutes), not only time-keeping stops (see page 10), but also all the preset data will be cancelled. A flashing 0:00 indicates this after power has been reapplied. In such cases, first correct the time indication and then re-enter the programming data.

Notes:

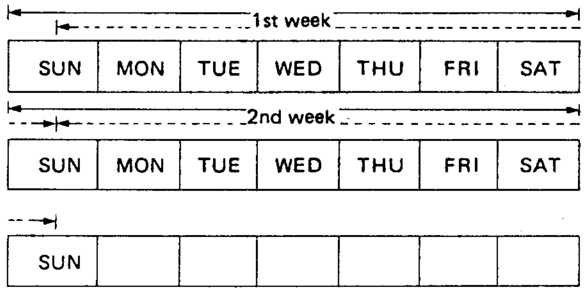
- After timer recording, press the TIMER button to OFF.
- When power is applied after timer recording, the recorder enters the Recording Pause mode. To operate the recorder as usual, first press the STOP button.

FOR A BETTER UNDERSTANDING OF THE PROGRAMMABLE TIMER TU-S10EK

Two-week timer

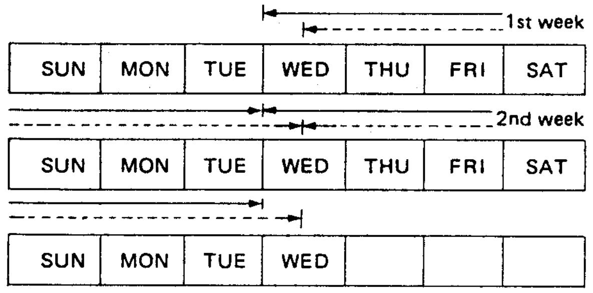
"Two-week" presetting capacity means that you can "reserve" recordings on any one of 14 days in advance including the day of setting.

If the current day of setting is Sunday:



- In this situation, there may be no possibility of confusion in setting the day.
- Namely, the "1st MON" is Monday of the current week and the "2nd MON" is Monday of the next week. The same applies to other week days.
- Regarding Sunday, there are two different cases; one is that you are going to set the timer to a time before the current time of setting and the other is that the preset time is a time after the current time of setting.
- In the former case, the "1st SUN" is the next Sunday and the "2nd SUN" is the Sunday after next.
- In the latter case, the "1st SUN" is the current Sunday and the "2nd SUN" is Sunday of the next week.

If the current day of setting is Wednesday for example:



- Remember that the "1st MON", "1st TUE" and so on . . . mean the first coming Monday, the first coming Tuesday, and so on, and not Monday of the current week.
- Similarly, the "2nd MON", "2nd TUE" and so on . . . are the second coming Monday, the second coming Tuesday, and so on, and not Monday or Tuesday of the next week.
- If you are on Wednesday for example, and wish to record something on Tuesday of the next week, the preset data should be "1st TUE". To record on Thursday of the next week, set "2nd THU".
- Regarding Wednesday, the same as mentioned about Sunday on the left applies.

8-programme timer

"8-programme" presetting capacity means that you can have 8 separate programme entries which contain different programming data. Because of this capacity, you can even "reserve" 8 different TV programmes, either on the same day or on different days.
Each programme (No. 1 through No. 8) entry contains information on "TV programme channel number", "day", "start time", "stop time" and "either single or repeat".

Example of the contents of one programme entry:

Programme number	TV programme channel number	Day	Start time	Stop time	Repeat
2	12	1st WED	12:30	13:00	–

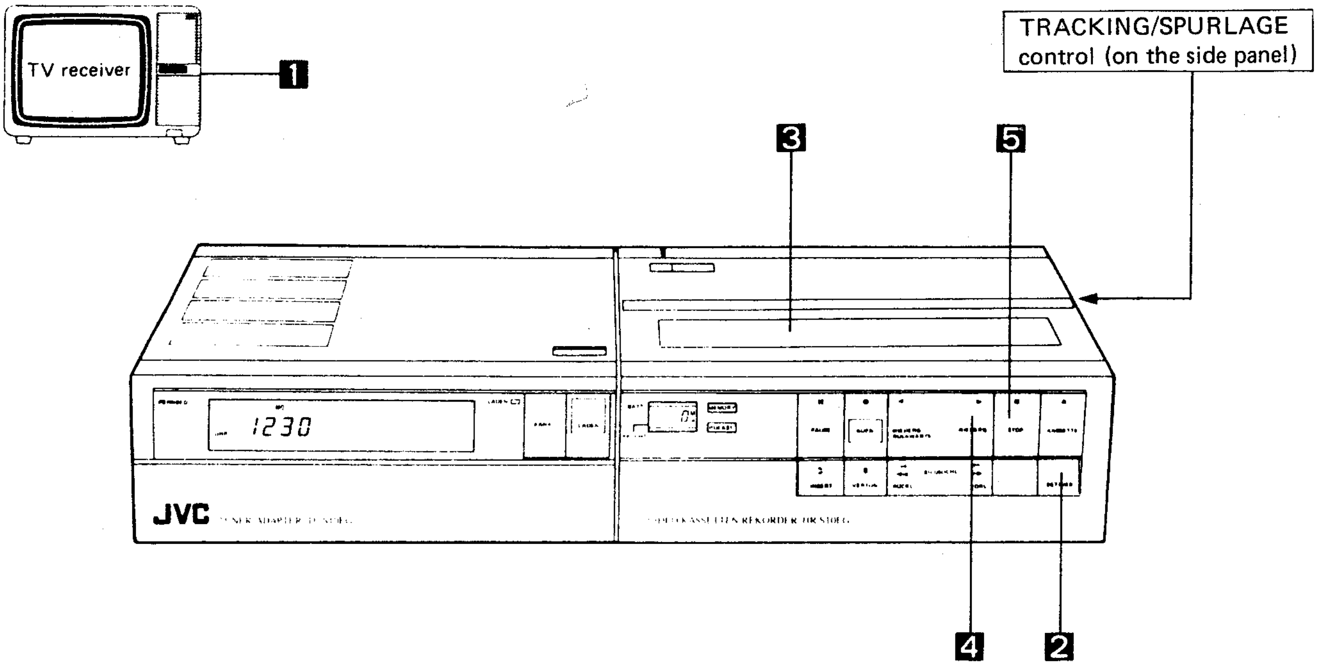
Variety of setting possibilities

- You can set for some day of the 1st week or the 2nd week.
- You can set for one day of every week by first setting that day of the 1st week and pressing the REPEAT button.
- You can set for one day of every week starting from the second week by first setting that day of the 2nd week and pressing the REPEAT button.
- You can set for all days. For this setting, obtain the indication "SUN MON TUE WED THU FRI SAT", and recordings will be repeated at the same time everyday for one week.
- You can set for all days week after week. For this setting, first obtain the indication as mentioned above and then press the REPEAT button. And recordings will be made everyday week after week.
- All the above applies for all 8 programme entries.

Programme priority

- If you have preset two programmes for the same day and the same switch-on time, the setting corresponding to the smaller programme number has priority.
- If two programmes have preset times which overlap, the earlier-started programme will be interrupted by the later one.

PLAYING BACK A VIDEO CASSETTE



1 Switch on the TV receiver.
Adjust the TV receiver's channel to the video channel. (For video channel setting, refer to page 36 of the instruction manual for the HR-S10EG/EK.

2 Press POWER/BETRIEB to ON.

3 Load a pre-recorded cassette.

4 Press PLAY/WIEDERG.

5 Press STOP at the end of the programme.

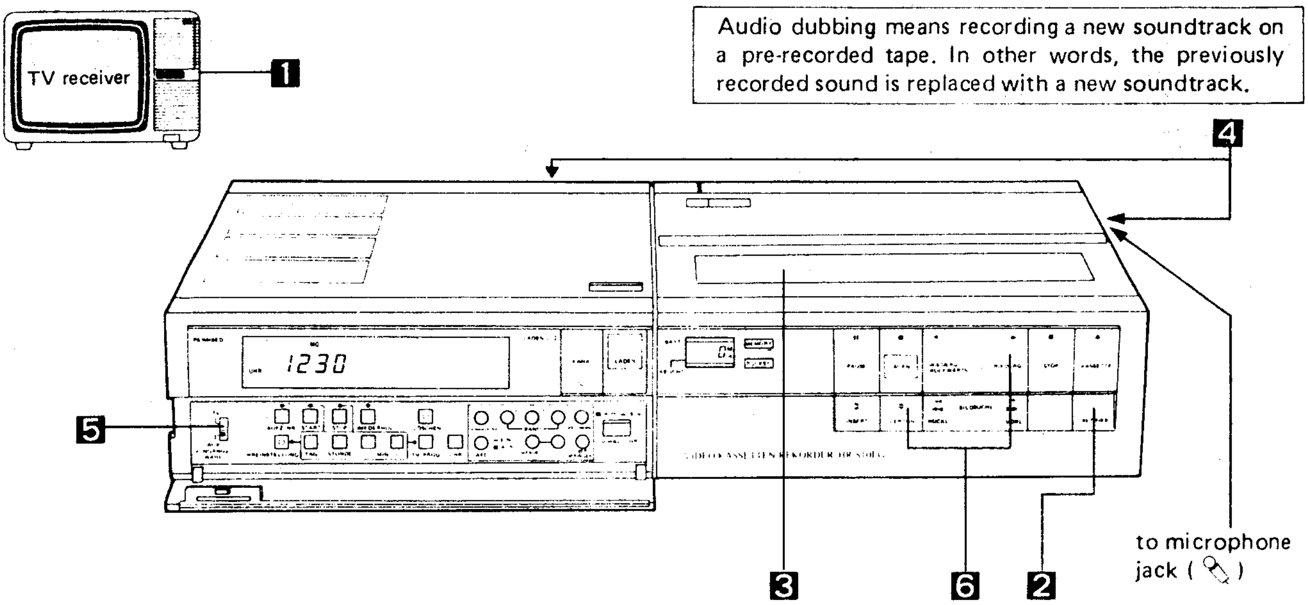
For special-effects playback such as Shuttle Search and reverse playback, refer to "MORE TAPE HANDLING FACILITIES" in the instruction manual for the HR-S10EG/EK.

Note:

- Noise bars may appear on the screen if you playback a tape which was recorded using another recorder. In such cases, adjust the TRACKING/SPURLAGE control on the right side panel of the HR-S10EG/EK. Turn it in either direction to adjust the picture. After playing a particular tape, return the control knob to the centre position.

AUDIO DUBBING

Audio dubbing means recording a new soundtrack on a pre-recorded tape. In other words, the previously recorded sound is replaced with a new soundtrack.



1 Switch on the TV receiver.
- Adjust the TV receiver's channel to your video channel. For connection to a TV receiver, refer to page 9.

2 Press POWER/BETRIEB.

3 Load a pre-recorded cassette.

4 Connect a microphone to the recorder's microphone jack (🎤) or an audio source to the tuner's AUDIO socket.

5 Set INPUT SELECT/EINGANGS-WAHL to AUX.
- If a microphone is connected to the recorder's microphone jack, the input from the microphone jack (🎤) has priority over other inputs. The INPUT SELECT/EINGANGS-WAHL switch may be in either position in this case.

6 Press PLAY/WIEDERG. while holding AUDIO DUB/VERTON. pressed.
- The AUDIO DUB/VERTON. and PLAY/WIEDERG. indicators will light and audio dubbing will start.
- To stop audio dubbing, press the STOP button.

The sound from the recorder's microphone jack or the tuner's AUDIO socket can be recorded with priority explained on page 30 of the instruction manual of the HR-S10EG/EK (The sound from the camera's microphone, either built-in or external, cannot be recorded in audio dubbing.)

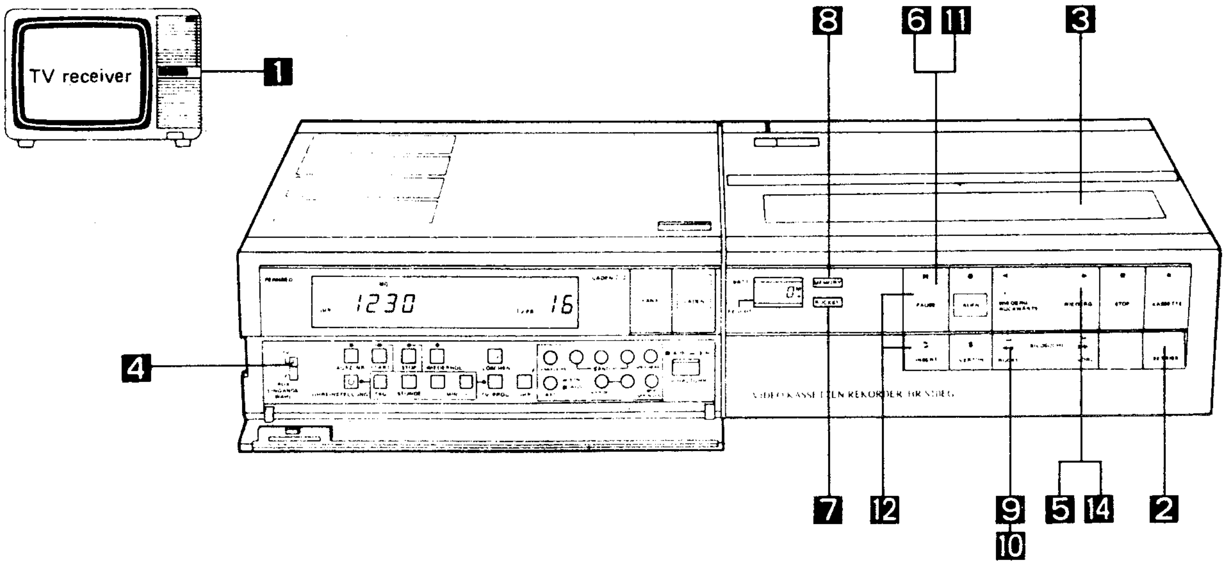
Notes:
- Audio dubbing is not possible onto a cassette whose safety tab has been removed.
- Use a high-impedance microphone.
- If whistling or howling is heard during audio dubbing, reduce the TV volume or move the microphone farther away from the TV. Recording is being performed even if sound is not heard from the TV receiver. If you want to monitor the sound being recorded, connect an earphone to the earphone jack (🎧) on the HR-S10EG/EK.
- The pause function facilitates audio dubbing. First play back the pre-recorded tape and press the PAUSE button at the point from which you wish to start audio dubbing. If necessary, adjust the point accurately by pressing the PAUSE button a few more times. Then press the PLAY/WIEDERG. while holding AUDIO DUB/VERTON. pressed. This permits you to start audio dubbing exactly at the right point.
- The TV sound from the tuner cannot be recorded in audio dubbing even when the INPUT SELECT/EINGANGS-WAHL switch is set to TV.

INSERT EDITING

Insert editing means recording a new scene into a section of pre-recorded tape so that a part of the original recording can be replaced with a new sequence without excessive picture distortion at edit-in and edit-out points. New video and audio signals to be inserted can come either from a video camera or another video cassette recorder, or from the tuner. Refer to page 4 of the instruction manual of the HR-S10EG/EK for information on the priority of video and audio input signals.

Connections
To insert video and audio signals from a camera, connect a camera to the recorder's CAMERA/KAMERA connector. See illustration on page 23.
To insert video and audio signals from another video recorder, connect the video and audio output connectors of the second video recorder to the VIDEO IN/VIDEO EINGANG connector and AUDIO socket of the tuner. See illustration on page 26.

Note:
- In the configuration using the tuner, start editing after the playback picture from the second recorder reaches its "clean" condition.



1 Switch on the TV receiver.
- Adjust the TV receiver's channel to the video channel.

2 Press POWER/BETRIEB.

3 Load a pre-recorded cassette.

4 Set INPUT SELECT/EINGANGS-WAHL as required.
AUX: To insert programmes from a different tape.
TV: To insert a TV programme from the tuner.

5 Play back the tape to determine the edit-out point (the end of the tape section to be replaced).

6 Press PAUSE at the edit-out point.

7 Press RESET/RÜCKST.
- The tape counter will be reset to "0".

8 Press the MEMORY button to obtain "M" in the display.

9 Hold REW/SHUTTLE SEARCH (RÜCKL./BILDSUCHLAUF) pressed to determine the edit-in point (the beginning of the tape section to be replaced).

10 Release REW/SHUTTLE SEARCH (RÜCKL./BILDSUCHLAUF) at a point slightly past the desired edit-in point; normal playback will start.

11 Press PAUSE at the edit-in point.

12 Press PAUSE while holding INSERT pressed.

- This engages the Insert Standby mode in which the input signal can be monitored on the TV screen; the still picture changes into the input signal that you are going to record.
- The input sound signal can also be monitored.

13 Operate the source equipment properly.

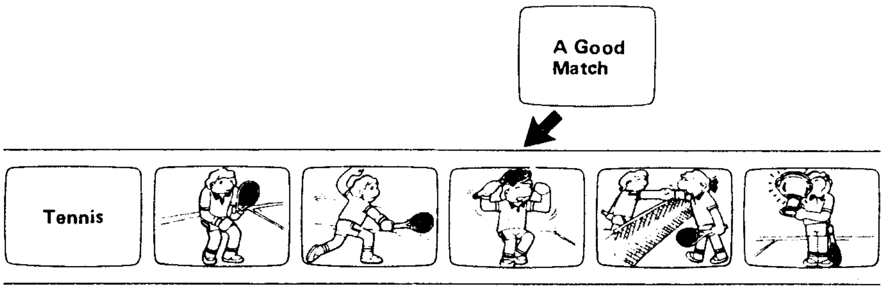
- Play back on another recorder the tape programme to be inserted.
- Operate the camera so that it is in the locked running mode.
- Select the channel of the tuner to be recorded.

14 Press PLAY/WIEDERG. Insert editing will start.

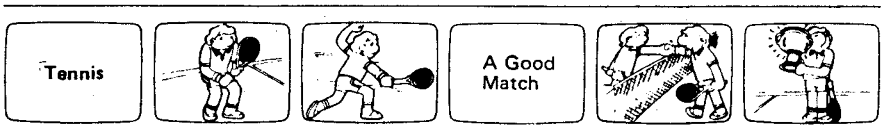
15 At the counter reading of "0", insert editing will stop automatically and the Play mode will be engaged. The INSERT indicator will go out.

Notes:

- Do not use the STOP button to stop insert editing. If you press the STOP button, the tape stops and the Insert Edit mode is cancelled.
- The insert editing mechanism used in the HR-S10EG/EK has been developed for home use applications. It may happen that pictures slightly distort or colours are incorrect at the edit points. This is not due to any defect of the unit.
- If there is a non-recorded section on the tape, the Insert Edit mode will be cancelled automatically in that section (INSERT indicator will go out) and the Play mode will be engaged.
- Insert editing is not possible with non-recorded cassettes or cassettes whose safety tab has been removed.

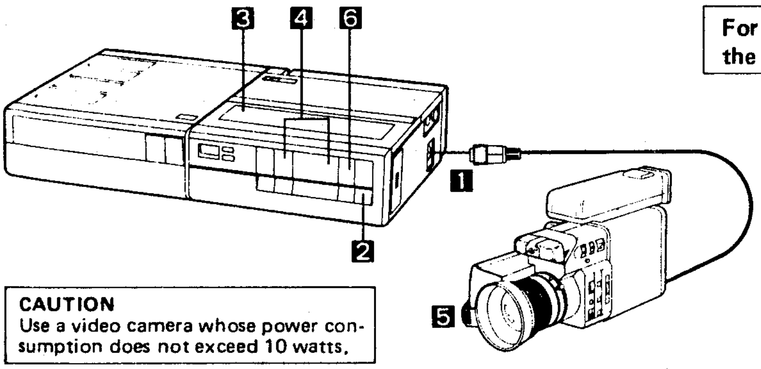


Original tape



Edited tape

RECORDING WITH A VIDEO CAMERA



CAUTION
Use a video camera whose power consumption does not exceed 10 watts.

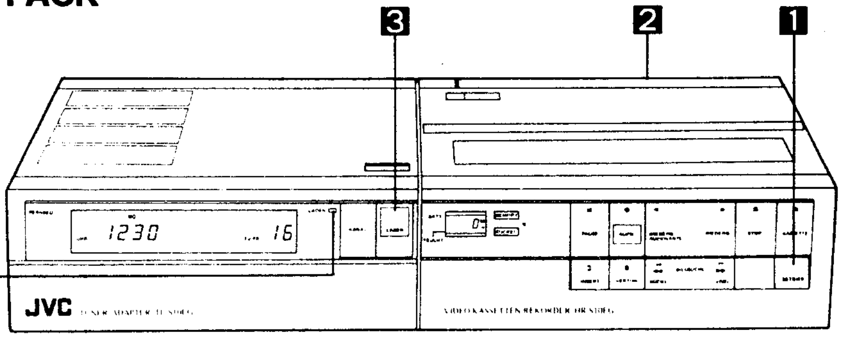
For more details refer to the instruction manual for the HR-S10EG/EK.

Procedure

1 Connect a video camera.
2 Press POWER/BETRIEB on the HR-S10EG/EK.
3 Load a cassette.
4 Press REC/AUFN. and PLAY/WIEDERG. simultaneously.
5 Operate the camera's start/stop switch.
6 To end recording, press STOP.

CHARGING THE BATTERY PACK

The TU-S10EG/EK can recharge the battery pack NB-P4U or NB-P3U attached to the HR-S10EG/EK recorder.



CHARGE/LADEN indicator

- Make sure that the CHARGE/LADEN indicator is off. If not, press the CHARGE/LADEN button so that the indicator extinguishes.

1 Switch power off by pressing the recorder's POWER/BETRIEB button.
   - The recorder's STOP indicator will go out.

2 Attach the battery pack to the rear of the recorder.

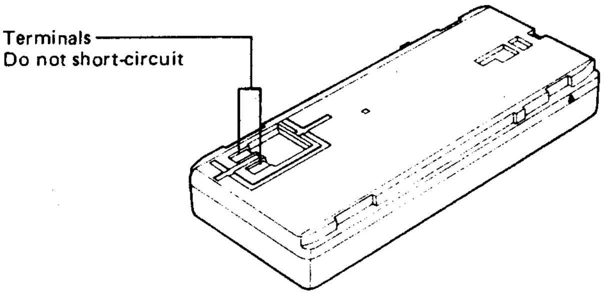
3 Press the CHARGE/LADEN button of the tuner.
   - The CHARGE/LADEN indicator will light and charging will start.
   - The NB-P4U will be charged in about 120 minutes.
   - The NB-P3U will be charged in about 80 minutes.
   - When charging is completed the CHARGE/LADEN indicator goes out.
   - During charging, the recorder cannot be operated; pressing the POWER/BETRIEB button has no effect. If the recorder is to be used, press the tuner's CHARGE/LADEN button to stop charging (the CHARGE/LADEN indicator goes out) and then press the recorder's POWER/BETRIEB button to ON. (The battery pack will not be fully charged.)

CAUTION

- Do not press the CHARGE/LADEN button when no battery pack is attached to the recorder. Even with no battery pack attached, the Charge mode will be entered and the CHARGE/LADEN indicator will light.
- Before attaching the battery pack to the recorder, make sure that the tuner's CHARGE/LADEN indicator is off. If not, press the CHARGE/LADEN button so that the indicator extinguishes.
- If the preset timer start time is reached during charging, charging is cancelled and timer recording starts. (Therefore, a "no light" condition of the CHARGE/LADEN indicator does not necessarily mean that charging has been completed.) It is recommended that you adjust the time of charging to prevent this from happening.

A WORD ON THE EXCLUSIVE NB-P4U/NB-P3U BATTERY PACKS (optional)

The NB-P4U/NB-P3U are nickel-cadmium batteries. Give attention to the following to make the most of their characteristics.



Temperature ranges:

The recharging time is based on room temperature of 20°C. The lower the temperature, the longer the recharging time.

For charging:	10°C to 35°C
For operating:	-10°C to 40°C
For storing:	-10°C to 30°C

The battery pack has been kept in the uncharged state for shipment. Therefore, before use, charge it.

- **Avoid repeated charging.**
  Charging the battery pack repeatedly without using it may cause over-charging and shorten its service life.
- **Recharge using only a specified charger at 10°C to 35°C.**
  Especially avoid recharging in a place under 10°C, as it may cause over-charging.
- **After use, store in a discharged condition.**
- **Do not store in places of high temperatures.**
  Choose a dry place with temperatures between -10°C and 30°C for optimum storage.
- **The battery pack becomes warm immediately after being charged. This is not due to any defect.**

CAUTION

The terminals are exposed on the bottom of the battery pack. DO NOT short-circuit these terminals.

- If they are shorted, a great amount of current flows. This is not only very dangerous, but also makes the battery pack unusable.
- When transporting or storing the battery pack, exercise special care so that no metallic object touches the terminals.

When left attached to the recorder, the battery pack discharges naturally. When not in use, make it a rule to remove the battery pack.

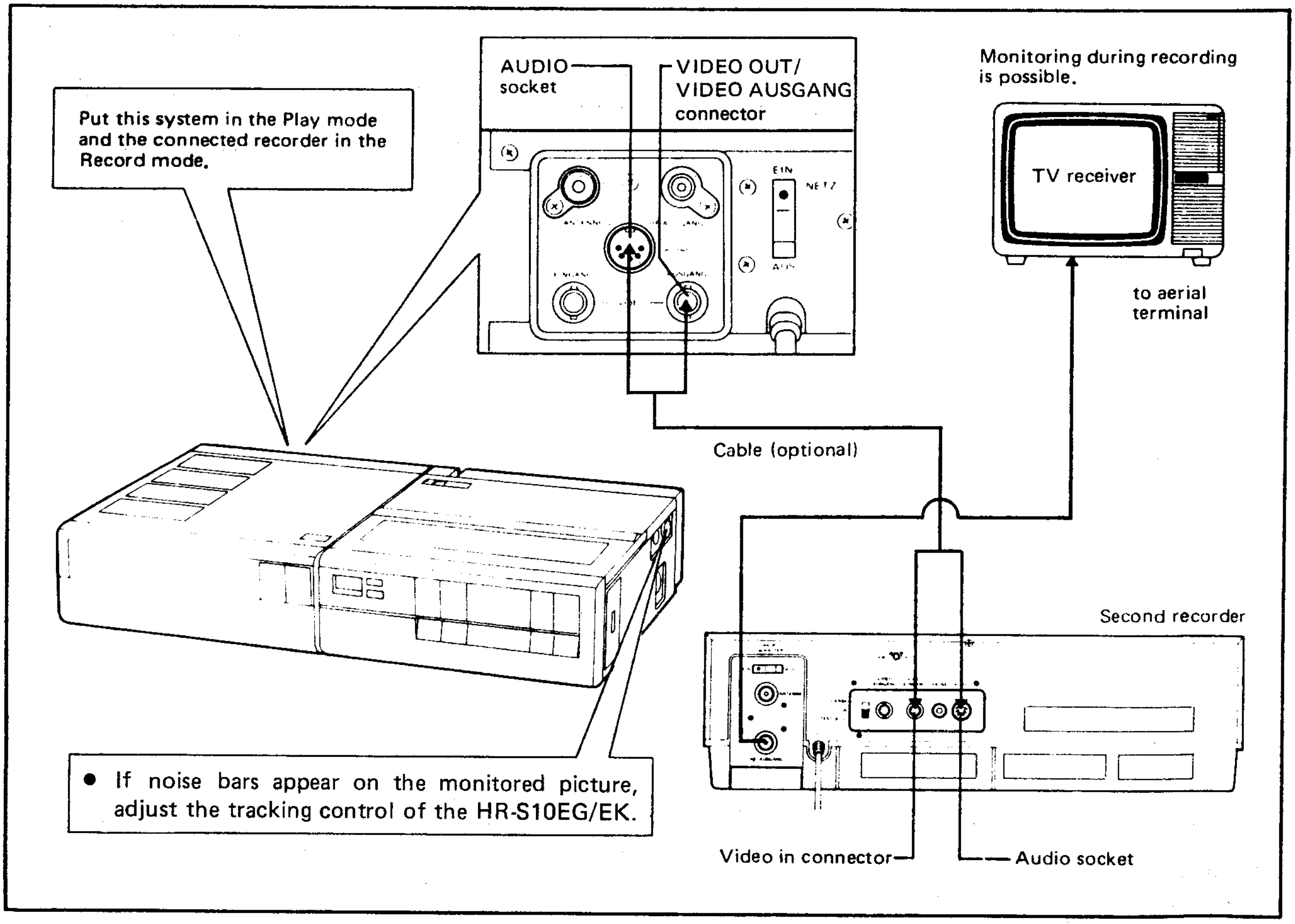
- Always keep the terminals clean. If they become dirty, wipe them with a piece of soft cloth.
- The fully charged NB-P4U battery pack provides power to the HR-S10EG/EK and a video camera (whose power consumption is about 6 watts) for about 60 minutes of continuous recording; the NB-P3U, for about 30 minutes.

TAPE-TO-TAPE EDITING

Tape-to-tape editing can be performed using the TU-S10EG/HR-S10EG, TU-S10EK/HR-S10EK combination and a second video recorder.

Using the TU-S10EG/HR-S10EG, TU-S10EK/HR-S10EK combination as a playback deck

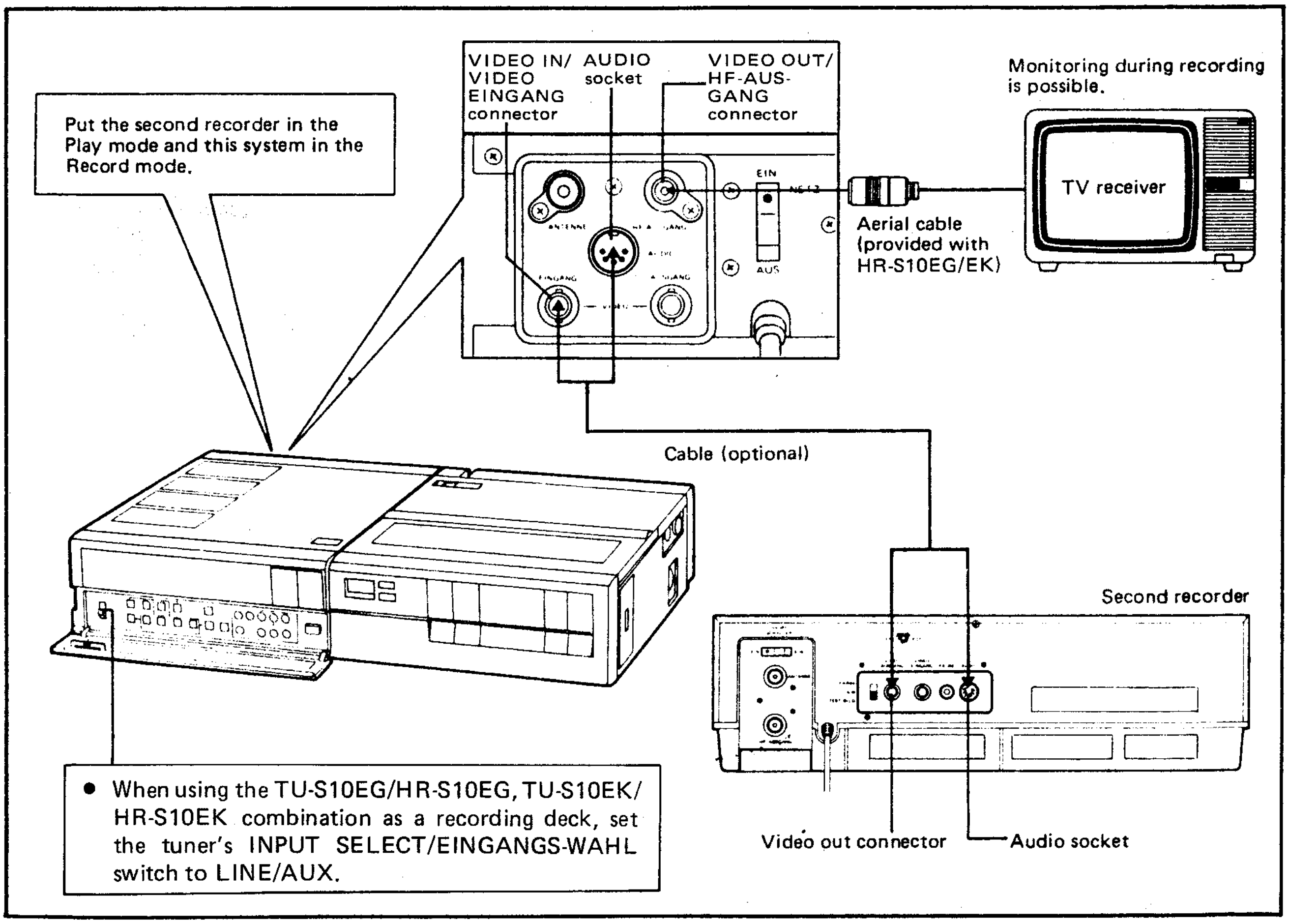
Connect the tuner's VIDEO OUT/VIDEO AUSGANG connector and AUDIO socket to the VIDEO IN/VIDEO EINGANG connector and AUDIO socket of the second recorder using an optionally available cable.


AUDIO socket
VIDEO OUT/ VIDEO AUSGANG connector
Put this system in the Play mode and the connected recorder in the Record mode.
Monitoring during recording is possible.
TV receiver
to aerial terminal
EIN
NETZ
Cable (optional)
Second recorder
Video in connector
Audio socket

- If noise bars appear on the monitored picture, adjust the tracking control of the HR-S10EG/EK.

Using the TU-S10EG/HR-S10EG, TU-S10EK/HR-S10EK combination as a recording deck.

Connect the tuner's VIDEO IN/VIDEO EINGANG connector and AUDIO socket to the Video out connector and Audio socket of the second recorder using an optionally available cable.


VIDEO IN/ VIDEO EINGANG connector
AUDIO socket
VIDEO OUT/ HF-AUS-GANG connector
Monitoring during recording is possible.
Put the second recorder in the Play mode and this system in the Record mode.
TV receiver
EIN
AUS
Aerial cable (provided with HR-S10EG/EK)
Cable (optional)
Second recorder
Video out connector
Audio socket

- When using the TU-S10EG/HR-S10EG, TU-S10EK/HR-S10EK combination as a recording deck, set the tuner's INPUT SELECT/EINGANGS-WAHL switch to LINE/AUX.

CAUTION

- **Copyrighted material must not be copied.**
- Tape-to-tape editing may cause slight deterioration of picture quality.
- If you connect a camera to the HR-S10EG/EK during tape-to-tape editing, the camera signal will be automatically recorded.

IN CASE OF DIFFICULTY

What may initially appear to be trouble is not always a real problem. Make sure first . . . .

Symptoms	Check points
No power is applied to the TU-S10EG/HR-S10EG, TU-S10EK/HR-S10EK system	● Is the power cord disconnected? – Connect it. – If it fails, reconnect it after a few seconds. ● Is the rear panel MAIN POWER/NETZ switch of the tuner set to ON/EIN? ● Is the tuner's CHARGE/LADEN indicator lit? – Press the tuner's CHARGE/LADEN button to turn the indicator off.
No power is applied to the tuner section while clock is functioning properly.	● Is the recorder correctly connected to the tuner? ● Is the recorder's POWER/BETRIEB button ON? ● Is the tuner's TIMER/SCHALTUHR button in the OFF/AUS position?
Playback picture does not appear while the tape is running.	● Is the TV receiver's channel selector set to the correct video channel? – Set to the RF converter channel.
TV broadcast cannot be recorded.	● Is the INPUT SELECT/EINGANGS-WAHL switch set to LINE/AUX? – Set to TV.
Some channels are skipped over when selecting a channel.	● Those channels are preset to be skipped over. If you need them, restore them. (See page 12.)
Channel cannot be switched.	● Is recording in progress? – During recording, you cannot change the channel. To change the channel, stop recording temporarily by pressing the PAUSE button and select another channel. Press the WIEDERG. button to restart recording.
Timer recording impossible.	● Is the clock time correct or the timer correctly set? – Check. ● Have you pressed the tuner's TIMER/SCHALTUHR butto to ON/EIN? ● Is the PLAY/WIDERG. indicator lit? – The loaded cassette may be without its safety tab. Press the TIMER/SCHALTUHR button to OFF/AUS and, after powering the recorder, replace the cassette with a recordable one.

SPECIFICATIONS

(TU-S10EG)

General

Power requirement : 220 V∿, 50/60 Hz
Power consumption : 29 W
Weight : 3.0 kg
Dimensions : 223(W) x 76.5(H) x 256(D) mm
Temperature
  Operating : 5°C to 40°C
  Storage : -20°C to 60°C

Tuner section

Channel coverage : VHF band I, 47 – 118 MHz
  VHF band III, 118 – 300 MHz
  UHF band IV/V, 470 – 862 MHz
Video line input : 0.5 to 2.0 Vp-p, 75 ohms unbalanced
Video line output : 1.0 Vp-p, 75 ohms
Audio line input : -20 dBs, 50 k-ohms, unbalanced
Audio line output : -6 dBs, 1 k-ohm, unbalanced

When combined with HR-S10EG

Timer section

Clock/timer indication : 24-hour fluorescent digital indication
Clock reference : Quartz controlled
Timer start setting : Within 2 weeks
Programming capacity: 8 programmes

AC power adapter/charger section

Rated output voltage : 12 V ⎓
Rated output current : Less than 1.3 A (adapter mode)
Battery pack to be charged : Exclusive Ni-Cad battery pack, NB-P4U/NB-P3U
Charging indicator : Provided

Provided accessories

Infrared remote control unit
"R6"-size battery x 2

Design and specifications subject to change without notice.

(TU-S10EK)

General

Power requirement : 220 V∿, 50/60 Hz
Power consumption : 29 W
Weight : 3.0 kg
Dimensions : 223(W) x 76.5(H) x 256(D) mm
Temperature
  Operating : 5°C to 40°C
  Storage : -20°C to 60°C

Tuner section

Channel coverage : UHF band IV/V, channels 21 – 69
Video line input : 0.5 to 2.0 Vp-p, 75 ohms unbalanced
Video line output : 1.0 Vp-p, 75 ohms
Audio line input : -20 dBs, 50 k-ohms, unbalanced
Audio line output : -6 dBs, 1 k-ohm, unbalanced

When combined with HR-S10EK

Timer section

Clock/timer indication : 24-hour fluorescent digital indication
Clock reference : Quartz controlled
Timer start setting : Within 2 weeks
Programming capacity: 8 programmes

AC power adapter/charger section

Rated output voltage : 12 V ⎓
Rated output current : Less than 1.3 A (adapter mode)
Battery pack to be charged : Exclusive Ni-Cad battery pack, NB-P4U/NB-P3U
Charging indicator : Provided

Provided accessories

Infrared remote control unit
"R6"-size battery x 2

E. & O. E. Design and specifications subject to change without notice.

JVC
VICTOR COMPANY OF JAPAN, LIMITED

NV4 EG Printed in Japan
PU30425-689

SECTION 1
GENERAL DESCRIPTION

1.1 TUNER SECTION

The EG type tuner is suitable for receiving West European (CCIR) PAL B (VHF) and PAL G (UHF) television standards. The negative modulated video signal bandwidth is 7 (8) MHz. Sound is frequency modulated (FM) at ± 50 kHz deviation.

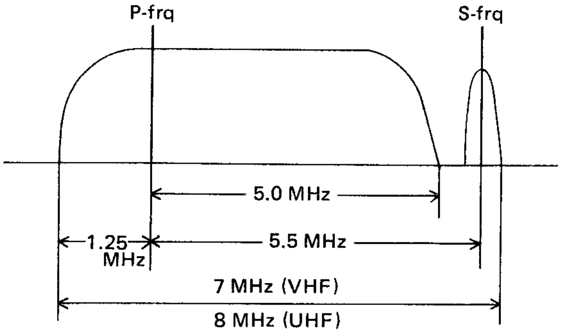


Fig. 1-1

Receivable frequencies are indicated in the following table.

CH	C-frq	Band width		P-frq	S-frq	Local osc	CH	C-frq	Band width		P-frq	S-frq	Local osc
2	50.50	54.00	47.00	48.25	53.75	87.15	40	626.00	630.00	622.00	623.25	628.75	662.15
3	57.50	61.00	54.00	55.25	60.75	94.15	41	634.00	638.00	630.00	631.25	636.75	670.15
4	64.50	68.00	61.00	62.25	67.75	101.15	42	642.00	646.00	638.00	639.25	644.75	678.15
5	177.50	181.00	174.00	175.25	180.75	214.15	43	650.00	654.00	646.00	647.25	652.75	686.15
6	184.50	188.00	181.00	182.25	187.75	221.15	44	658.00	662.00	654.00	655.25	660.75	694.15
7	191.50	195.00	188.00	189.25	194.75	228.15	45	666.00	670.00	662.00	663.25	668.75	702.15
8	198.50	202.00	195.00	196.25	201.75	235.15	46	674.00	678.00	670.00	671.25	676.75	710.15
9	205.50	209.00	202.00	203.25	208.75	242.15	47	682.00	686.00	678.00	679.25	684.75	718.15
10	212.50	216.00	209.00	210.25	215.75	249.15	48	690.00	694.00	686.00	687.25	692.75	726.15
11	219.50	223.00	216.00	217.25	222.75	256.15	49	698.00	702.00	694.00	695.25	700.75	734.15
12	226.50	230.00	223.00	224.25	229.75	263.15	50	706.00	710.00	702.00	703.25	708.75	742.15
21	474.00	478.00	470.00	471.25	476.75	510.15	51	714.00	718.00	710.00	711.25	716.75	750.15
22	482.00	486.00	478.00	479.25	484.75	518.15	52	722.00	726.00	718.00	719.25	724.75	758.15
23	490.00	494.00	486.00	487.25	492.75	526.15	53	730.00	734.00	726.00	727.25	732.75	766.15
24	498.00	502.00	494.00	495.25	500.75	534.15	54	738.00	742.00	734.00	735.25	740.75	774.15
25	506.00	510.00	502.00	503.25	508.75	542.15	55	746.00	750.00	742.00	743.25	748.75	782.15
26	514.00	518.00	510.00	511.25	516.75	550.15	56	754.00	758.00	750.00	751.25	756.75	790.15
27	522.00	526.00	518.00	519.25	524.75	558.15	57	762.00	766.00	758.00	759.25	764.75	798.15
28	530.00	534.00	526.00	527.25	532.75	566.15	58	770.00	774.00	766.00	767.25	772.75	806.15
29	538.00	542.00	534.00	535.25	540.75	574.15	59	778.00	782.00	774.00	775.25	780.75	814.15
30	546.00	550.00	542.00	543.25	548.75	582.15	60	786.00	790.00	782.00	783.25	788.75	822.15
31	554.00	558.00	550.00	551.25	556.75	590.15	61	794.00	798.00	790.00	791.25	796.75	830.15
32	562.00	566.00	558.00	559.25	564.75	598.15	62	802.00	806.00	798.00	799.25	804.75	838.15
33	570.00	574.00	566.00	567.25	572.75	606.15	63	810.00	814.00	806.00	807.25	812.75	846.15
34	578.00	582.00	574.00	575.25	580.75	614.15	64	818.00	822.00	814.00	815.25	820.75	854.15
35	586.00	590.00	582.00	583.25	588.75	622.15	65	826.00	830.00	822.00	823.25	828.75	862.15
36	594.00	598.00	590.00	591.25	596.75	630.15	66	834.00	838.00	830.00	831.25	836.75	870.15
37	602.00	606.00	598.00	599.25	604.75	638.15	67	842.00	846.00	838.00	839.25	844.75	878.15
38	610.00	614.00	606.00	607.25	612.75	646.15	68	850.00	854.00	846.00	847.25	852.75	886.15
39	618.00	622.00	614.00	615.25	620.75	654.15	69	858.00	862.00	854.00	855.25	860.75	894.15

Unit : MHz

Table 1-1

The EK type tuner is suitable for receiving UK television standard. Sound is frequency modulated. Video is negative modulated with bandwidth of 8 MHz.

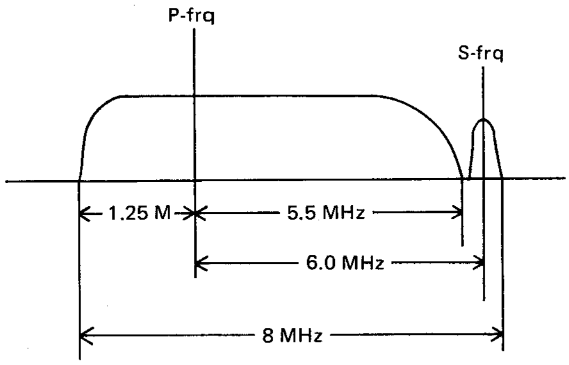


Fig. 1-2

Receivable frequencies are indicated in the following table.

CH	C-frq	Band width		P-frq	S-frq	Local osc	CH	C-frq	Band width		P-frq	S-frq	Local osc
21	474.00	478.00	470.00	471.25	477.25	510.75	46	674.00	678.00	670.00	671.25	677.25	710.75
22	482.00	486.00	478.00	479.25	485.25	518.75	47	682.00	686.00	678.00	679.25	685.25	718.75
23	490.00	494.00	486.00	487.25	493.25	526.75	48	690.00	694.00	686.00	687.25	693.25	726.75
24	498.00	502.00	494.00	495.25	501.25	534.75	49	698.00	702.00	694.00	695.25	701.25	734.75
25	506.00	510.00	502.00	503.25	509.25	542.75	50	706.00	710.00	702.00	703.25	709.25	742.75
26	514.00	518.00	510.00	511.25	517.25	550.75	51	714.00	718.00	710.00	711.25	717.25	750.75
27	522.00	526.00	518.00	519.25	525.25	558.75	52	722.00	726.00	718.00	719.25	725.25	758.75
28	530.00	534.00	526.00	527.25	533.25	566.75	53	730.00	734.00	726.00	727.25	733.25	766.75
29	538.00	542.00	534.00	535.25	541.25	574.75	54	738.00	742.00	734.00	735.25	741.25	774.75
30	546.00	550.00	542.00	543.25	549.25	582.75	55	746.00	750.00	742.00	743.25	749.25	782.75
31	554.00	558.00	550.00	551.25	557.25	590.75	56	754.00	758.00	750.00	751.25	757.25	790.75
32	562.00	566.00	558.00	559.25	565.25	598.75	57	762.00	766.00	758.00	759.25	765.25	798.75
33	570.00	574.00	566.00	567.25	573.25	606.75	58	770.00	774.00	766.00	767.25	773.25	806.75
34	578.00	582.00	574.00	575.25	581.25	614.75	59	778.00	782.00	774.00	775.25	781.25	814.75
35	586.00	590.00	582.00	583.25	589.25	622.75	60	786.00	790.00	782.00	783.25	789.25	822.75
36	594.00	598.00	590.00	591.25	597.25	630.75	61	794.00	798.00	790.00	791.25	797.25	830.75
37	602.00	606.00	598.00	599.25	605.25	638.75	62	802.00	806.00	798.00	799.25	805.25	638.75
38	610.00	614.00	606.00	607.25	613.25	646.75	63	810.00	814.00	806.00	807.25	813.25	846.75
39	618.00	622.00	614.00	615.25	621.25	654.75	64	818.00	822.00	814.00	815.25	821.25	854.75
40	626.00	630.00	622.00	623.25	629.25	662.75	65	826.00	830.00	822.00	823.25	829.25	862.75
41	634.00	638.00	630.00	631.25	637.25	670.75	66	834.00	838.00	830.00	831.25	837.25	870.75
42	642.00	646.00	638.00	639.25	645.25	678.75	67	842.00	846.00	838.00	839.25	845.25	878.75
43	650.00	654.00	646.00	647.25	653.25	686.75	68	850.00	854.00	846.00	847.25	853.25	886.75
44	658.00	662.00	654.00	655.25	661.25	694.75	69	858.00	862.00	854.00	855.25	861.25	894.75
45	66.00	670.00	662.00	663.25	669.25	702.75							

Unit : MHz

Table 1-2

1.2 TIMER SECTION

1. Power connection

Connecting the AC connector yields the Power Interrupt mode. "CLOCK "0:00" is displayed and all digits flash.

2. Time setting

While holding the CLOCK ADJ button depressed, press the appropriate DAY, HOUR, MIN (+) or MIN (–) button. When held depressed for longer than 1 second, the setting increments or decrements automatically.

3. Program setting

Press the PROGRAM button, then the START button. Set the recording start day, hour and minute, the recording end time, and the recording channel.

Up to 8 programs can be set within a 2 week period.

1.3 BATTERY CHARGE CONTROL SECTION

1. Insert an uncharged battery into the HR-S10 and set the power OFF. Press the CHARGE button. The CHARGE LED lights and quick charging begins 5 seconds later.
2. The full charge detector circuit detects full charge and automatically stops the charging process.
3. After start of charging, if full charge is not detected within 110 minutes, charging is stopped automatically in order to protect the battery.

1.4 TUNER CONTROL SECTION

A voltage synthesizer system is employed in the tuner section. The memory is capable of storing up to 32 channels (EK: 16 channels). The following figure shows a summarized tuner block diagram.

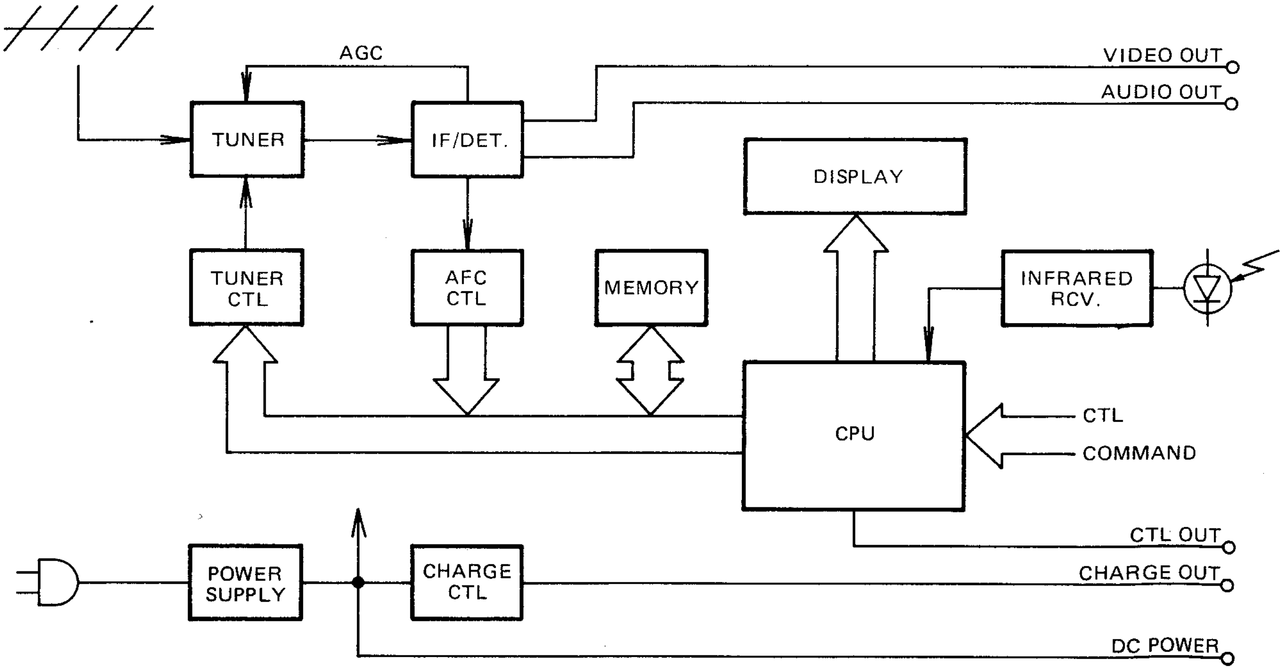

AGC
VIDEO OUT
AUDIO OUT
TUNER
IF/DET.
DISPLAY
TUNER CTL
AFC CTL
MEMORY
INFRARED RCV.
CPU
CTL
COMMAND
CTL OUT
CHARGE OUT
DC POWER
POWER SUPPLY
CHARGE CTL

Fig. 1-3

SECTION 2
ADJUSTMENT

2.1 POWER SUPPLY/TIMER, ADJUSTMENT

2.1.1 12V DC adjust

1. Connect a DC voltmeter between CN7 2-1 and ground.
2. Adjust R10 of the bottom board to obtain 12.3 V.

2.1.2 Charge voltage check

1. Without inserting a battery, set for the Charge mode.
2. Confirm more than 25.0 V at the charge terminal.

2.1.3 Timer CPU (IC2) clock frequency adjust

1. Connect a frequency counter to TP2 (front board). Short the leads of C61 of the bottom board.
2. Adjust C7 of the front board to obtain 4.19430 Hz.

2.2 TUNER/IF CIRCUIT ADJUSTMENTS

Preparation

Required Equipment

1. Oscilloscope
2. RF signal generator/IF sweep signal generator with suitable markers (PIF, SIF, etc.).
3. DC Power Supplies:
   12.0 V for power bias
   Approx. 5 V variable for IF AGC bias
4. Sweeper probe (sweep signal supply cable) such as illustrated in Fig. 2-1.

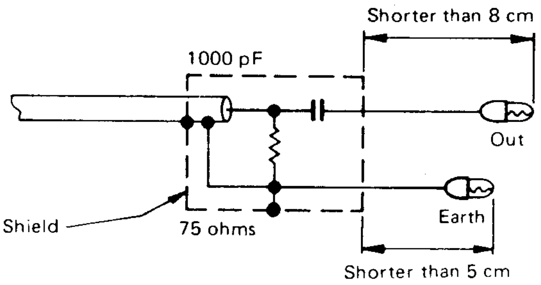


Fig. 2-1 Sweeper probe

2.2.1 IF adjustment-1

1. Set the RF generator frequency for 38.9 MHz (EG) or 39.5 MHz (EK), AM 60%, 70 dBu. Connect the RF generator output to pin 9 of IC1 (M51316P).
2. Connect oscilloscope to TP2.
3. Supply variable DC bias voltage to TP14 and adjust the voltage to obtain 150 mVp-p at TP2.
4. Adjust T3 for maximum voltage at TP2.
5. In the same manner as above step 3, supply variable DC bias voltage to TP14 and adjust the voltage to obtain 150 mVp-p at TP2. Set the RF generator frequency for 33.4 MHz (EG) or 33.5 MHz (EK), AM 60%, 90 dBu.
6. Adjust T2 to obtain minimum voltage.
7. Set the RF generator frequency for 38.9 MHz (EG) or 39.5 MHz (EK), FM 80 kHz deviation, 70 dBu.
8. Connect the oscilloscope to pin 24 of IC1.
9. Adjust transformer T4 to obtain a symmetrical waveform at IC1 pin 24 (with AGC OFF and AFC ON).

2.2.2 IF adjustment-2

1. Connect the RF generator output to the IF input of the TUNER/IF board.
2. Set the generator frequency for 32.4 MHz and connect oscilloscope to the SAW device input.
3. Adjust T6 to obtain minimum output.
4. Set the RF generator frequency for 34.47 MHz (EG) or 35.07 MHz (EK), AM 60%.
5. Tune T1 for maximum voltage at IC1 pin 29.

2.2.3 Color level adjustment

1. Receive a color bar pattern signal via the antenna input.
2. Set the AFC switch ON.
3. Connect oscilloscope to CN1 pin 9 and observe the video output.
4. Adjust R33 obtain a magenta color level of 0.93 Vp-p (EG) or 0.80 Vp-p (EK) with respect to a total video level of 1.8 Vp-p.
5. Confirm a video to sync ratio of 7 : 3.

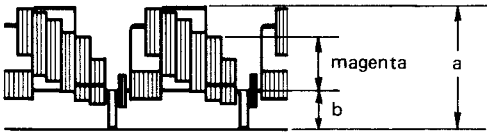


Fig. 2-2

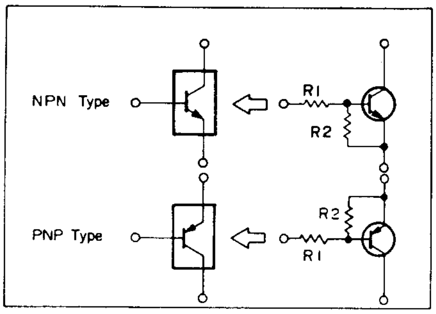
2.2.4 Audio level adjustment

1. Receive the audio test signal via the antenna input.
2. Connect audio level meter to pin 1 of CN3.
3. Adjust R19 to obtain an audio level of –18 dBs (EG) or –14 dBs (EK).

SECTION 3
CHARTS AND DIAGRAMS

3.1 DIGITAL TRANSISTOR, IC & TRANSISTOR PACKAGE VIEWS

DIGITAL TRANSISTOR



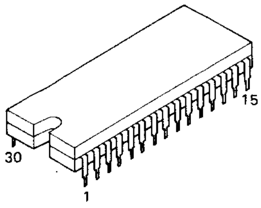
RESISTOR VALUES

JUNCTION	Part NO.	R1 (KΩ)	R2 (KΩ)
PNP	DTA114	10	10
	DTA124	22	22
	DTA144	47	47
	DTA144WF	47	22
	DTA114Y	10	47
	DTA114T	10	OPEN
	2SA1345	47	47
	2SA1346	22	22
NPN	DTC114	10	10
	DTC124	22	22
	DTC144	47	47
	DTC144WT	47	22
	DTC114Y	10	47
	DTC143T	4.7	OPEN
	2SC3399	47	47
	2SC3400	22	22

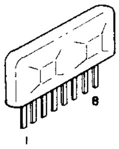
Note: The digital transistor includes built in resistors.
It features small size and high reliability.
Both PNP and NPN types are available.

USES: INVERTER, INTERFACE, DRIVER CIRCUITS.

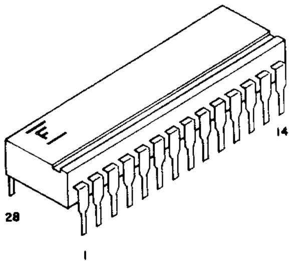
M51316P



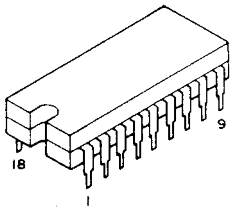
BQ050



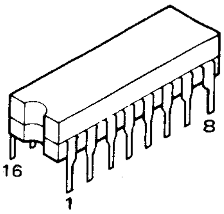
MB8854M-469L



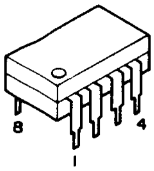
MN1219



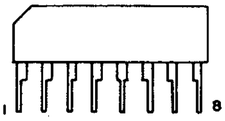
UPC1042C
LA7913



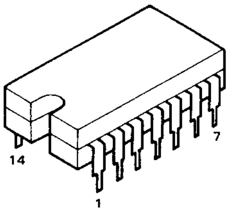
TL066CP



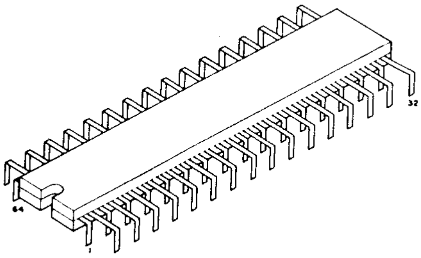
UPC1373H



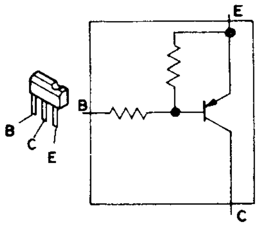
LM339N



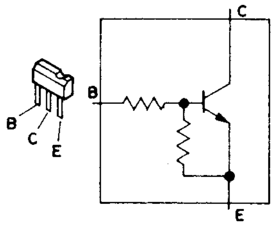
UPD7519H-013-36



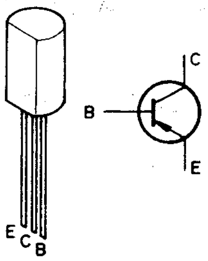
DTA144F
DTA144WF



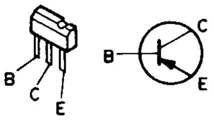
DTC124F
DTC144F
DTC144WF



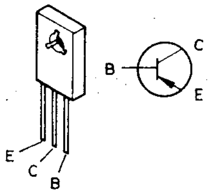
2SA1020O,Y
2SB598E,F



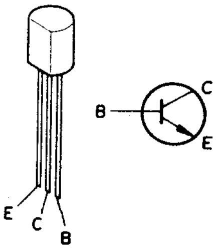
2SA1254C
2SA874Q,R
2SB644P,Q,R



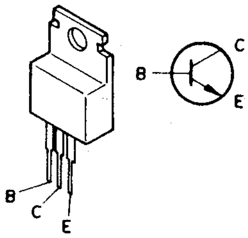
2SB744P,Q



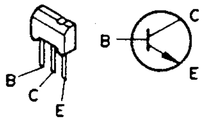
2SC3070



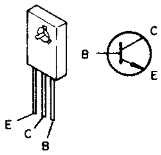
2SC2562O
2SD880Y



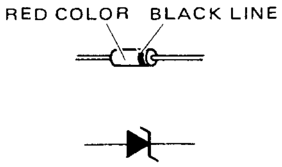
2SC2636T
2SC2647C
2SD1330S
2SD637R,S
2SD637R
2SD637P,Q,R
2SD639R,S



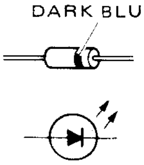
2SD882P,Q



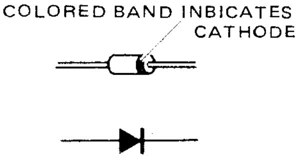
HZ SERIES


RED COLOR
BLACK LINE

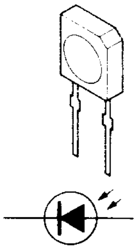
LTZ-R15



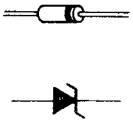
MA150	**WHITE**
MA167	**PURPLE**
1SS133	**YELLOW**


COLORED BAND INBICATES CATHODE

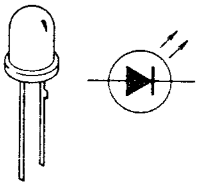
PH302



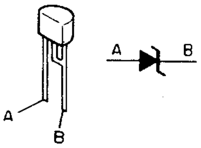
RD4.3EB
RD6.8EB



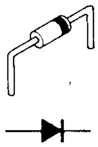
SLR-34VC12F



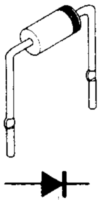
UPC574J-KL



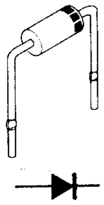
10E2FA5
11E2



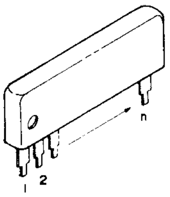
30D2FC



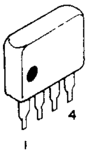
31DQ04FC



EXB-P84104M (5 pin)
-P85333M (6 pin)
-P86333M (7 pin)
-P86104 (7 pin)
-P88333M (9 pin)

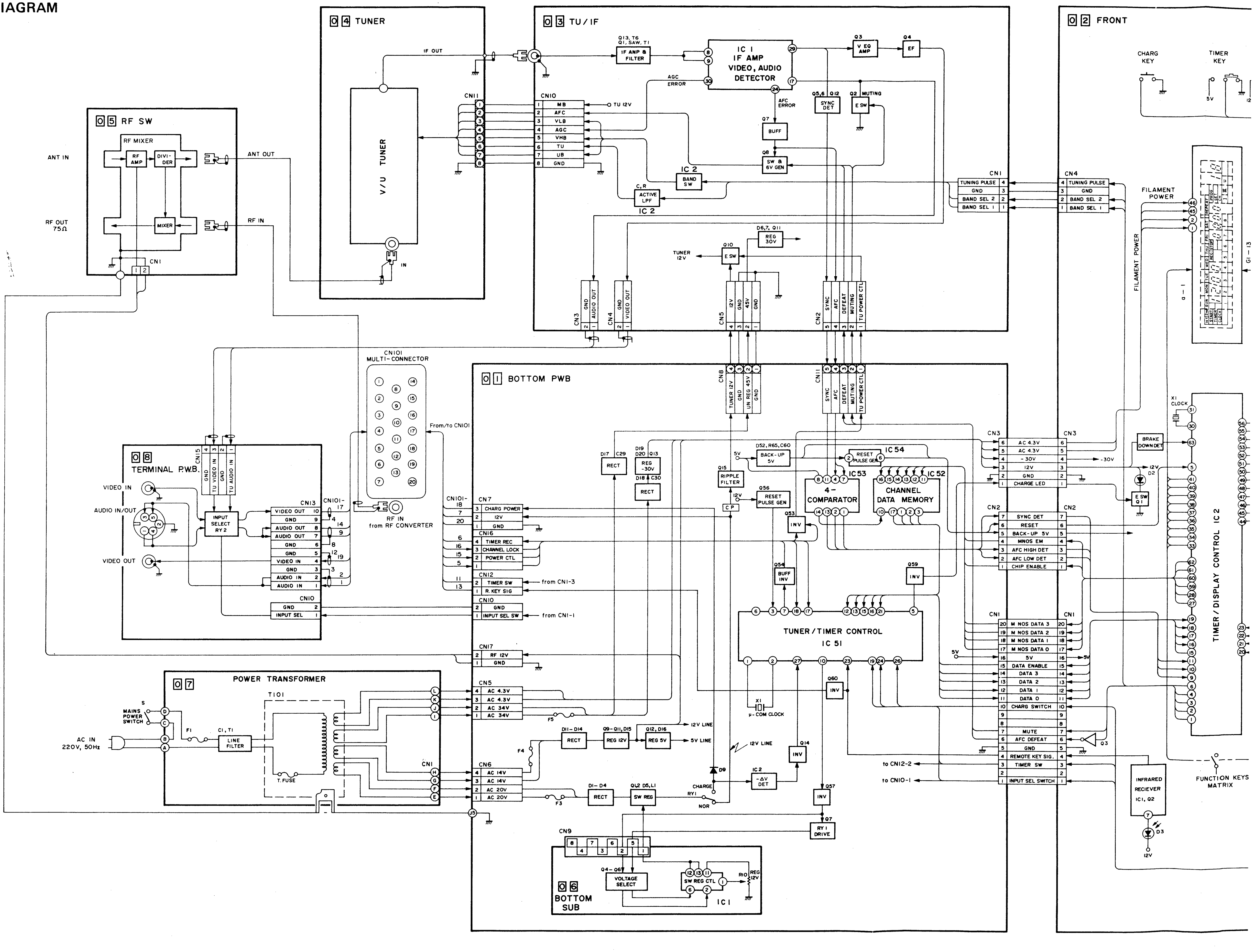


FRE3333M



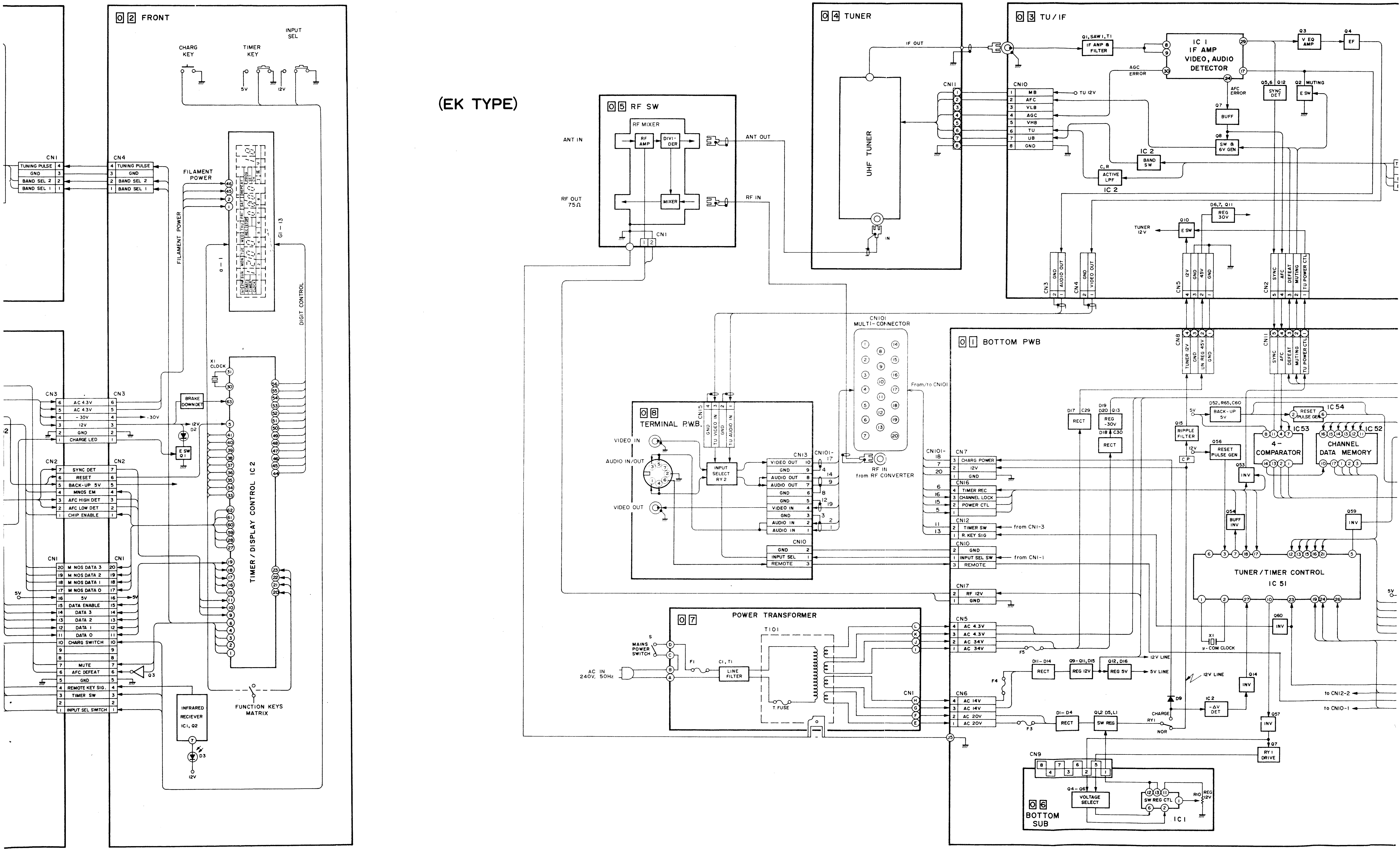
3.2 OVERALL BLOCK DIAGRAM

(EG TYPE)

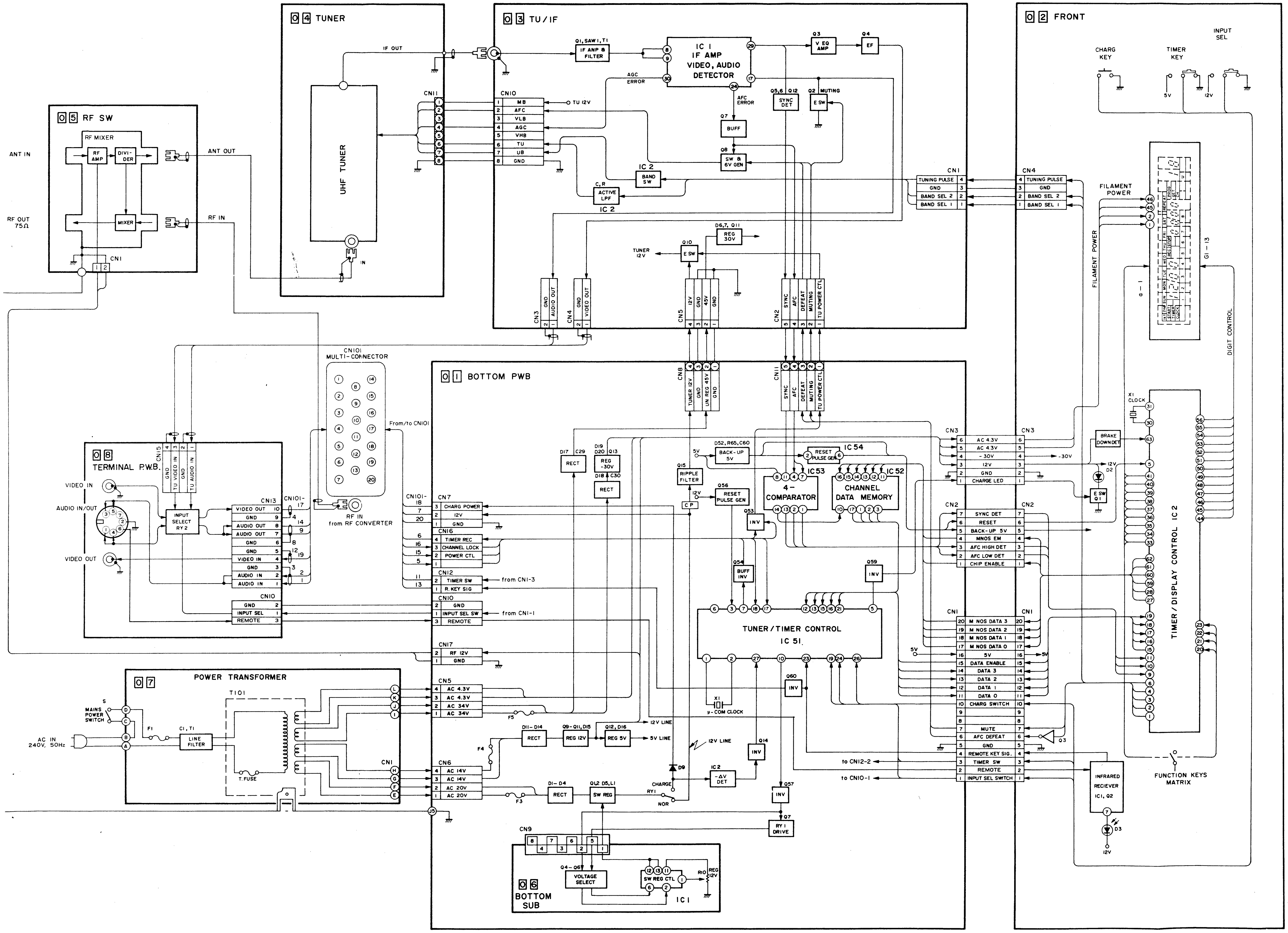


04 TUNER
IF OUT
V/U TUNER
IN
CN11
03 TU/IF
Q13, T6 Q1, SAW, T1
IF AMP & FILTER
IC 1 IF AMP VIDEO, AUDIO DETECTOR
AGC ERROR
AFC ERROR
Q3 V EQ AMP
Q4 EF
Q5,6 Q12 SYNC DET
Q2 MUTING E SW
Q7 BUFF
Q8 SW & 6V GEN
IC 2 BAND SW
C, R ACTIVE LPF IC 2
CN10
MB
AFC
VLB
AGC
VHB
TU
UB
GND
TU 12V
D6,7, Q11 REG 30V
Q10 E SW
TUNER 12V
CN3 GND AUDIO OUT
CN4 GND VIDEO OUT
CN5 12V GND 45V GND
CN2 SYNC AFC DEFEAT MUTING TU POWER CTL
CN1 TUNING PULSE GND BAND SEL 2 BAND SEL 1
05 RF SW
RF MIXER
ANT IN
RF AMP
DIVI-DER
MIXER
ANT OUT
RF OUT 75Ω
RF IN
CN1
CN101 MULTI-CONNECTOR
From/to CN101
RF IN from RF CONVERTER
08 TERMINAL P.W.B.
VIDEO IN
AUDIO IN/OUT
VIDEO OUT
CN15 GND TU VIDEO IN GND TU AUDIO IN
INPUT SELECT RY2
CN13
VIDEO OUT
GND
AUDIO OUT
AUDIO OUT
GND
GND
VIDEO IN
GND
AUDIO IN
AUDIO IN
CN10 GND INPUT SEL
CN101-17
01 BOTTOM PWB
CN8 TUNER 12V GND UN REG 45V GND
CN11 SYNC AFC DEFEAT MUTING TU POWER CTL
CN7 CHARG POWER 12V GND
CN16 TIMER REC CHANNEL LOCK POWER CTL
CN12 TIMER SW R. KEY SIG
from CN1-3
CN10 GND INPUT SEL SW
from CN1-1
CN17 RF 12V GND
D17 C29 RECT
D19 D20 Q13 REG -30V
D18 C30 RECT
Q15 RIPPLE FILTER
CP
D52, R65, C60 BACK-UP 5V
Q56 RESET PULSE GEN
RESET PULSE GEN IC54
IC53 4-COMPARATOR
IC52 CHANNEL DATA MEMORY
Q53 INV
Q54 BUFF INV
Q59 INV
TUNER/TIMER CONTROL IC 51
X1 μ-COM CLOCK
Q60 INV
Q14 INV
IC 2 -ΔV DET
Q57 INV
Q7 RY1 DRIVE
CHARGE RY1 NOR
D9
12V LINE
5V LINE
D11-D14 RECT
Q9-Q11, D15 REG 12V
Q12, D16 REG 5V
D1-D4 RECT
Q12 D5, L1 SW REG
F3
F4
F5
CN5 AC 4.3V AC 4.3V AC 34V AC 34V
CN6 AC 14V AC 14V AC 20V AC 20V
J5
07 POWER TRANSFORMER
T101
T. FUSE
S MAINS POWER SWITCH
AC IN 220V, 50Hz
F1
C1, T1 LINE FILTER
CN1
CN9
06 BOTTOM SUB
Q4-Q6 VOLTAGE SELECT
SW REG CTL
IC1
R10 REG 12V
CN3 AC 4.3V AC 4.3V -30V 12V GND CHARGE LED
CN2 SYNC DET RESET BACK-UP 5V MNOS EM AFC HIGH DET AFC LOW DET CHIP ENABLE
CN1 M NOS DATA 3 M NOS DATA 2 M NOS DATA 1 M NOS DATA 0 5V DATA ENABLE DATA 3 DATA 2 DATA 1 DATA 0 CHARG SWITCH MUTE AFC DEFEAT GND REMOTE KEY SIG. TIMER SW INPUT SEL SWITCH
to CN12-2
to CN10-1
02 FRONT
CHARG KEY
TIMER KEY
CN4 TUNING PULSE GND BAND SEL 2 BAND SEL 1
FILAMENT POWER
G1-13
a-1
X1 CLOCK
BRAKE DOWN DET
E SW Q1
D2
Q3
-30V
TIMER/DISPLAY CONTROL IC2
INFRARED RECIEVER IC1, Q2
D3
FUNCTION KEYS MATRIX

(EK TYPE)

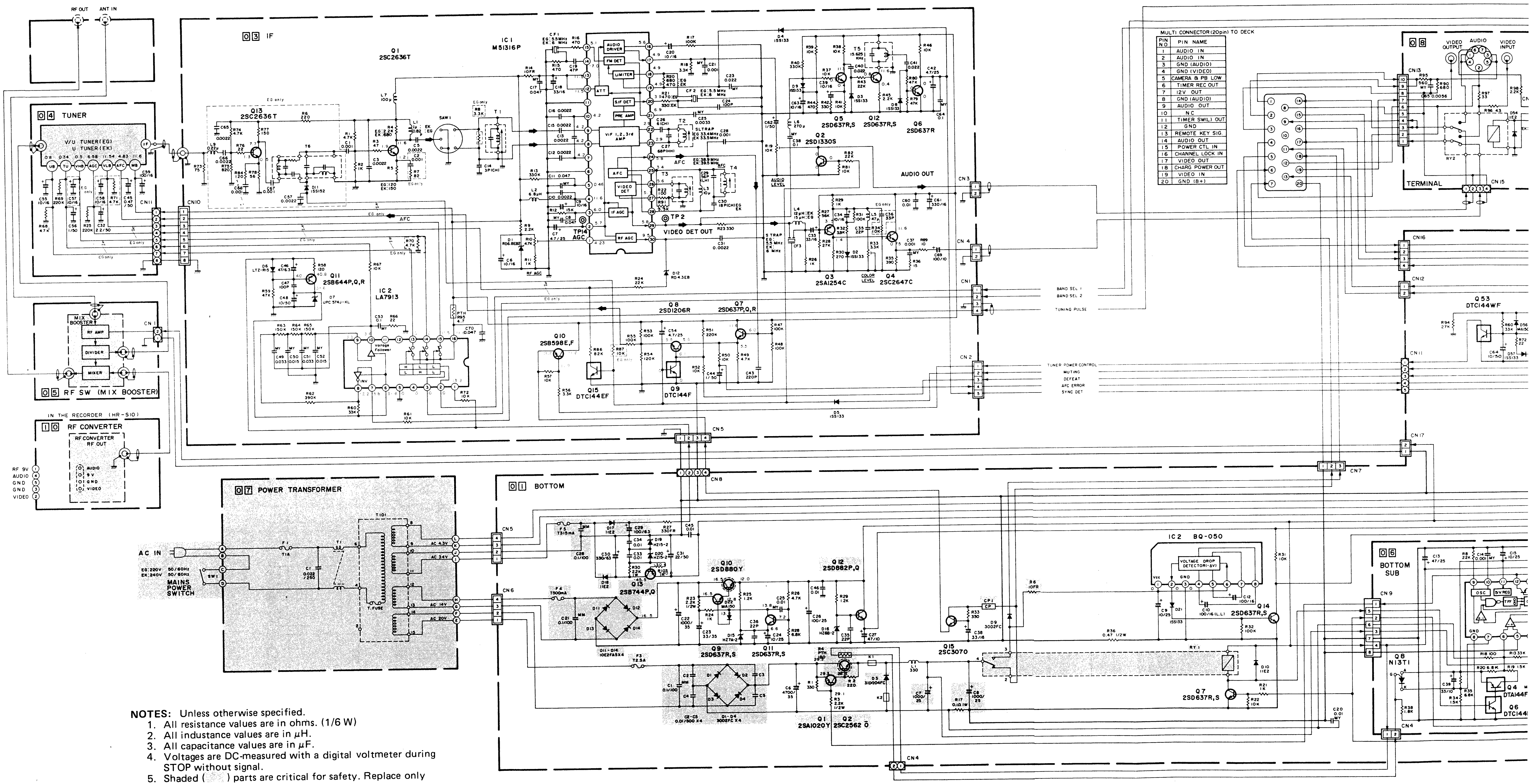

02 FRONT
CHARG KEY
TIMER KEY
INPUT SEL
5V
12V
FILAMENT POWER
TIMER/DISPLAY CONTROL IC 2
X1 CLOCK
BRAKE DOWN DET
E SW Q1
D2
DIGIT CONTROL
G1-13
FUNCTION KEYS MATRIX
INFRARED RECIEVER IC1, Q2
D3
Q3
CN1
CN2
CN3
CN4
TUNING PULSE
GND
BAND SEL 2
BAND SEL 1
AC 4.3V
-30V
12V
CHARGE LED
SYNC DET
RESET
BACK-UP 5V
MNOS EM
AFC HIGH DET
AFC LOW DET
CHIP ENABLE
M NOS DATA 3
M NOS DATA 2
M NOS DATA 1
M NOS DATA 0
5V
DATA ENABLE
DATA 3
DATA 2
DATA 1
DATA 0
CHARG SWITCH
MUTE
AFC DEFEAT
REMOTE KEY SIG.
TIMER SW
INPUT SEL SWITCH
05 RF SW
ANT IN
RF OUT 75Ω
RF MIXER
RF AMP
DIVIDER
MIXER
ANT OUT
RF IN
04 TUNER
IF OUT
UHF TUNER
IN
03 TU/IF
Q1, SAW1, T1 IF AMP & FILTER
IC 1 IF AMP VIDEO, AUDIO DETECTOR
AGC ERROR
AFC ERROR
Q3 V EQ AMP
Q4 EF
Q5,6 Q12 SYNC DET
Q2 MUTING E SW
Q7 BUFF
Q8 SW & 6V GEN
IC 2 BAND SW
C, R ACTIVE LPF IC 2
CN10
MB
AFC
VLB
AGC
VHB
TU
UB
GND
TU 12V
D6,7, Q11 REG 30V
Q10 E SW
TUNER 12V
CN3 GND AUDIO OUT
CN4 GND VIDEO OUT
CN5 12V GND 45V GND
CN2 SYNC AFC DEFEAT MUTING TU POWER CTL
CN101 MULTI-CONNECTOR
From/to CN101
RF IN from RF CONVERTER
08 TERMINAL P.W.B.
VIDEO IN
AUDIO IN/OUT
VIDEO OUT
CN15 GND TU VIDEO IN GND TU AUDIO IN
INPUT SELECT RY2
CN13
VIDEO OUT
AUDIO OUT
AUDIO IN
INPUT SEL
REMOTE
01 BOTTOM PWB
CN8 TUNER 12V GND UN REG 45V GND
CN11 SYNC AFC DEFEAT MUTING TU POWER CTL
D17 C29 RECT
D19 D20 Q13 REG -30V
D18 C30 RECT
Q15 RIPPLE FILTER
D52, R65, C60 BACK-UP 5V
IC54 RESET PULSE GEN
IC53 4-COMPARATOR
IC52 CHANNEL DATA MEMORY
Q56 RESET PULSE GEN
CP
Q53 INV
Q54 BUFF INV
Q59 INV
TUNER/TIMER CONTROL IC 51
X1 µ-COM CLOCK
Q60 INV
Q14 INV
Q57 INV
Q7 RY1 DRIVE
IC2 -ΔV DET
CN7 CHARG POWER 12V GND
CN16 TIMER REC CHANNEL LOCK POWER CTL
CN12 TIMER SW R. KEY SIG
from CN1-3
from CN1-1
CN17 RF 12V GND
CN5 AC 4.3V AC 34V
CN6 AC 14V AC 20V
D11-D14 RECT
Q9-Q11, D15 REG 12V
Q12, D16 REG 5V
12V LINE
5V LINE
D1-D4 RECT
Q12 D5, L1 SW REG
CHARGE RY1 NOR
D9
F3
F4
F5
to CN12-2
to CN10-1
07 POWER TRANSFORMER
T101
MAINS POWER SWITCH
AC IN 240V, 50Hz
F1
C1, T1 LINE FILTER
T.FUSE
CN9
06 BOTTOM SUB
Q4-Q6 VOLTAGE SELECT
SW REG CTL IC1
R10 REG 12V
J5

TU-610EG.



04 TUNER
IF OUT
UHF TUNER
IN
CN11
03 TU/IF
Q1, SAW1, T1
IF AMP & FILTER
IC 1
IF AMP
VIDEO, AUDIO
DETECTOR
AGC ERROR
AFC ERROR
Q3
V EQ AMP
Q4
EF
Q5,6 Q12
SYNC DET
Q2 MUTING
E SW
Q7
BUFF
Q8
SW & 6V GEN
CN10
MB
AFC
VLB
AGC
VHB
TU
UB
GND
TU 12V
IC 2
BAND SW
C, R
ACTIVE LPF
IC 2
CN1
TUNING PULSE
GND
BAND SEL 2
BAND SEL 1
D6,7, Q11
REG 30V
Q10
E SW
TUNER 12V
CN3
GND
AUDIO OUT
CN4
GND
VIDEO OUT
CN5
12V
GND
45V
GND
CN2
SYNC
AFC
DEFEAT
MUTING
TU POWER CTL
05 RF SW
RF MIXER
RF AMP
DIVI-DER
MIXER
ANT IN
ANT OUT
RF OUT 75Ω
RF IN
CN1
CN101
MULTI-CONNECTOR
From/to CN101
RF IN
from RF CONVERTER
08
TERMINAL P.W.B.
CN15
GND
TU VIDEO IN
GND
TU AUDIO IN
VIDEO IN
AUDIO IN/OUT
VIDEO OUT
INPUT SELECT RY2
CN13
VIDEO OUT
GND
AUDIO OUT
AUDIO OUT
GND
GND
VIDEO IN
GND
AUDIO IN
AUDIO IN
CN101-17
CN10
GND
INPUT SEL
REMOTE
01 BOTTOM PWB
CN101-18
CN7
CHARG POWER
12V
GND
CN16
TIMER REC
CHANNEL LOCK
POWER CTL
CN12
TIMER SW
R. KEY SIG
from CN1-3
CN10
GND
INPUT SEL SW
REMOTE
from CN1-1
CN17
RF 12V
GND
CN5
AC 4.3V
AC 4.3V
AC 34V
AC 34V
F5
CN6
AC 14V
AC 14V
AC 20V
AC 20V
F3
F4
CN8
TUNER 12V
GND
UN REG 45V
GND
CN11
SYNC
AFC
DEFEAT
MUTING
TU POWER CTL
D17 C29
RECT
D19 D20 Q13
REG -30V
D18 C30
RECT
Q15
RIPPLE FILTER
CP
D52, R65, C60
BACK-UP 5V
5V
12V
Q56
RESET PULSE GEN
IC54
RESET PULSE GEN
IC53
4-COMPARATOR
IC52
CHANNEL DATA MEMORY
Q53
INV
Q54
BUFF INV
Q59
INV
TUNER/TIMER CONTROL
IC 51
X1
μ-COM CLOCK
Q60
INV
D11-D14
RECT
Q9-Q11, D15
REG 12V
Q12, D16
REG 5V
12V LINE
5V LINE
12V LINE
Q14
INV
D9
IC2
-ΔV DET
CHARGE
RY1
NOR
D1-D4
RECT
Q12 D5, L1
SW REG
Q57
INV
Q7
RY1 DRIVE
to CN12-2
to CN10-1
CN9
06
BOTTOM SUB
Q4-Q6
VOLTAGE SELECT
SW REG CTL
IC1
R10
REG 12V
07
POWER TRANSFORMER
T101
S
MAINS POWER SWITCH
AC IN 240V, 50Hz
F1
C1, T1
LINE FILTER
T. FUSE
J5
CN3
AC 4.3V
AC 4.3V
-30V
12V
GND
CHARGE LED
CN2
SYNC DET
RESET
BACK-UP 5V
MNOS EM
AFC HIGH DET
AFC LOW DET
CHIP ENABLE
CN1
M NOS DATA 3
M NOS DATA 2
M NOS DATA 1
M NOS DATA 0
5V
DATA ENABLE
DATA 3
DATA 2
DATA 1
DATA 0
CHARG SWITCH
MUTE
AFC DEFEAT
GND
REMOTE KEY SIG.
TIMER SW
REMOTE
INPUT SEL SWITCH
02 FRONT
CHARG KEY
TIMER KEY
INPUT SEL
5V
12V
CN4
TUNING PULSE
GND
BAND SEL 2
BAND SEL 1
FILAMENT POWER
FILAMENT POWER
DIGIT CONTROL
G1-13
a-i
X1 CLOCK
BRAKE DOWN DET
12V
D2
E SW Q1
-30V
TIMER / DISPLAY CONTROL IC 2
Q3
INFRARED RECIEVER IC1, Q2
D3
12V
FUNCTION KEYS MATRIX

3.3 TUNER/IF BOTTOM & FRONT SCHEMATIC DIAGRAM

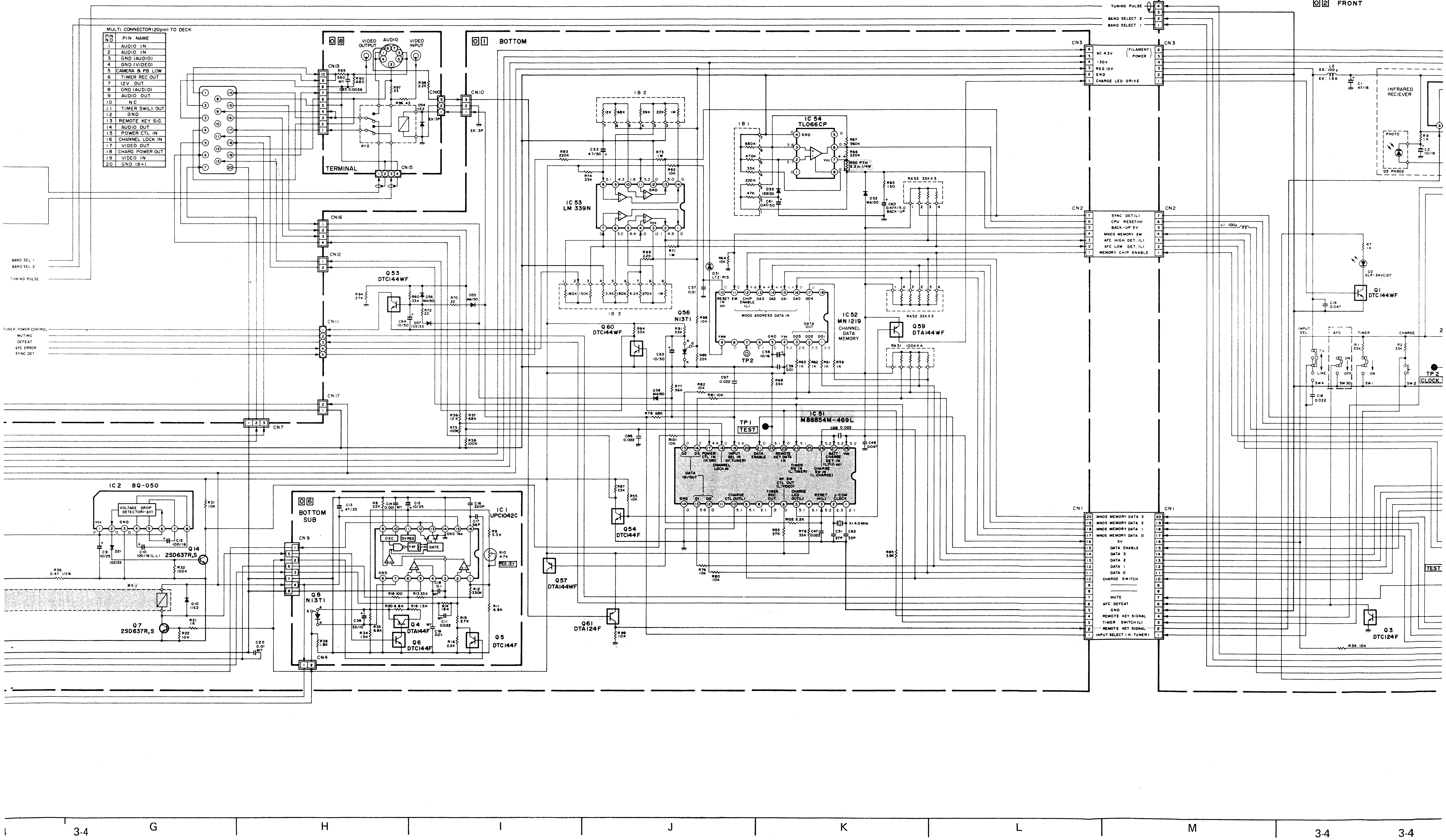

RF OUT
ANT IN
03 IF
04 TUNER
V/U TUNER (EG)
U TUNER (EK)
05 RF SW (MIX BOOSTER)
MIX BOOSTER
RF AMP
DIVIDER
MIXER
IN THE RECORDER (HR-S10)
10 RF CONVERTER
RF CONVERTER RF OUT
RF 9V
AUDIO
GND
GND
VIDEO
CN10
CN11
Q13 2SC2636T
Q1 2SC2636T
SAW1
IC1 M51316P
AUDIO DRIVER
FM DET
LIMITER
ATT
SIF DET
PRE AMP
VIF 1,2,3rd AMP
AFC
VIDEO DET
IF AGC
RF AGC
TP1 AGC
TP2 VIDEO DET OUT
Q11 2SB644P,Q,R
IC2 LA7913
Voltage Follower
Q8 2SD1206R
Q7 2SD637P,Q,R
Q10 2SB598E,F
Q15 DTC144EF
Q9 DTC144F
Q5 2SD637R,S
Q12 2SD637R,S
Q6 2SD637R
Q2 2SD1330S
AUDIO OUT
AUDIO LEVEL
COLOR LEVEL
Q3 2SA1254C
Q4 2SC2647C
CN1
CN2
CN3
CN4
CN5
CN8
BAND SEL 1
BAND SEL 2
TUNING PULSE
TUNER POWER CONTROL
MUTING
DEFEAT
AFC ERROR
SYNC DET
07 POWER TRANSFORMER
AC IN
EG:220V 50/60Hz
EK:240V 50/60Hz
MAINS POWER SWITCH
SW1
T101
T.FUSE
AC 4.3V
AC 34V
AC 14V
AC 20V
01 BOTTOM
Q10 2SD880Y
Q13 2SB744P,Q
Q12 2SD882P,Q
Q9 2SD637R,S
Q11 2SD637R,S
Q1 2SA1020Y
Q2 2SC2562 O
Q15 2SC3070
IC2 BQ-050
VOLTAGE DROP DETECTOR(-3V)
Q14 2SD637R,S
Q7 2SD637R,S
RY1
CN6
CN7
08 TERMINAL
VIDEO OUTPUT
AUDIO
VIDEO INPUT
RY2
CN13
CN15
CN16
CN12
CN17
Q53 DTC144WF
06 BOTTOM SUB
Q8 N13T1
Q4 DTA144F
Q6 DTC144F
CN9
OSC
3-4
A
B
C
D
E
G
H
1
2
3
4
5
6

MULTI CONNECTOR (20pin) TO DECK

PIN NO	PIN NAME
1	AUDIO IN
2	AUDIO IN
3	GND (AUDIO)
4	GND (VIDEO)
5	CAMERA & PB LOW
6	TIMER REC OUT
7	12V OUT
8	GND (AUDIO)
9	AUDIO OUT
10	NC
11	TIMER SW(L) OUT
12	GND
13	REMOTE KEY SIG.
14	AUDIO OUT
15	POWER CTL IN
16	CHANNEL LOCK IN
17	VIDEO OUT
18	CHARG POWER OUT
19	VIDEO IN
20	GND (8+)

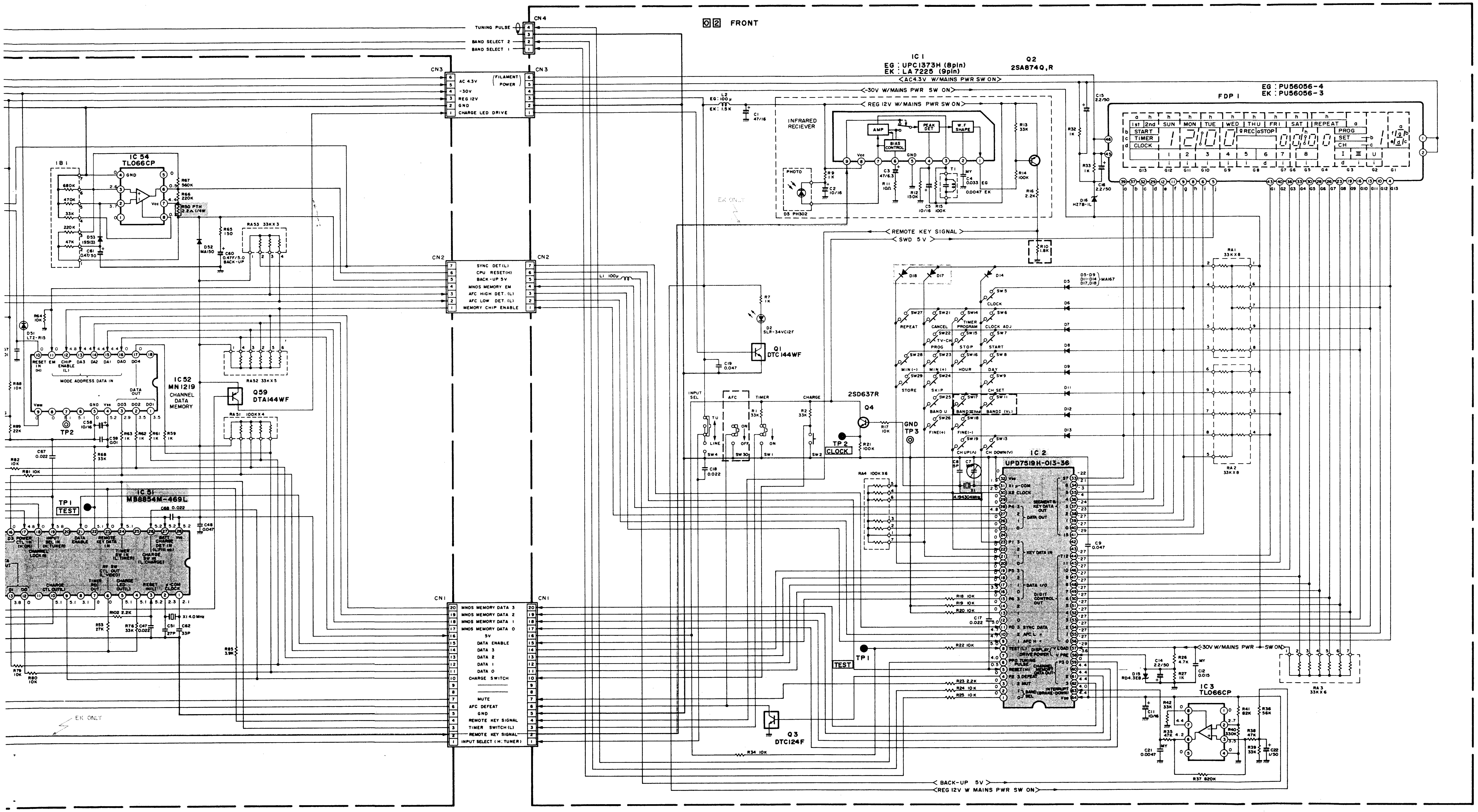
NOTES: Unless otherwise specified.

1. All resistance values are in ohms. (1/6 W)
2. All industance values are in μH.
3. All capacitance values are in μF.
4. Voltages are DC-measured with a digital voltmeter during STOP without signal.
5. Shaded (   ) parts are critical for safety. Replace only with specified part numbers.
6. – – – – – – – EG only.
7. – – – – – – – EK only.

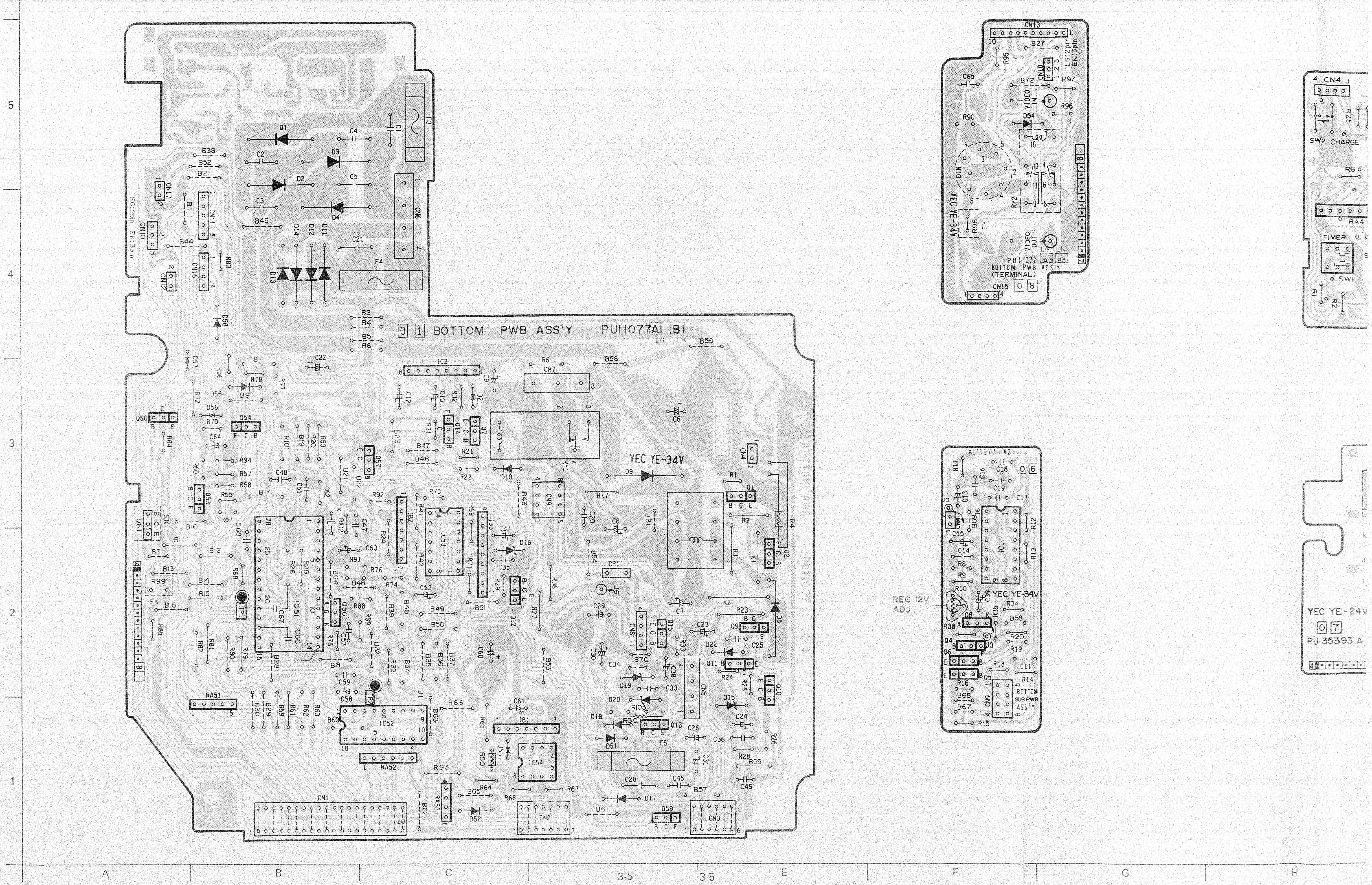

02 FRONT
01 BOTTOM
08 TERMINAL
06 BOTTOM SUB
CN4
TUNING PULSE
BAND SELECT 2
BAND SELECT 1
CN3
AC 4.3V (FILAMENT POWER)
-30V
REG 12V
GND
CHARGE LED DRIVE
CN2
SYNC DET(L)
CPU RESET(H)
BACK-UP 5V
MNOS MEMORY EM
AFC HIGH DET. (L)
AFC LOW DET. (L)
MEMORY CHIP ENABLE
CN1
MNOS MEMORY DATA 3
MNOS MEMORY DATA 2
MNOS MEMORY DATA 1
MNOS MEMORY DATA 0
5V
DATA ENABLE
DATA 3
DATA 2
DATA 1
DATA 0
CHARGE SWITCH
MUTE
AFC DEFEAT
GND
REMOTE KEY SIGNAL
TIMER SWITCH(L)
REMOTE KEY SIGNAL
INPUT SELECT (H: TUNER)
IC 61
MB8854M-469L
D2
D3
POWER CTL IN (H:ON)
CHANNEL LOCK IN
INPUT SEL IN (H:TUNER)
DATA ENABLE
REMOTE KEY DATA IN
TIMER SW IN (L:TIMER)
CHARGE SW IN (L:CHARGE)
BATT CHARGE DET IN (L:F(I) up)
Vss
DATA IN/OUT
GND
DI
DO
CHARGE CTL OUT(L)
TIMER REC OUT
RF SW CTL OUT (L:VIDEO)
CHARGE LED OUT(L)
RESET IN(L)
μ-COM CLOCK
X1 4.0 MHz
TP1
TEST
TP2
IC 52
MN1219
CHANNEL DATA MEMORY
RESET IN (H)
EM
CHIP ENABLE (L)
DA3
DA2
DA1
DA0
DO4
MODE ADDRESS DATA IN
DATA OUT
DO3
DO2
DO1
IC 54
TL066CP
IC 53
LM 339N
IB 1
IB 2
IB 3
RA53 33K×3
RA52 33K×5
RA51 100K×4
D51 LTZ-R15
D52 MA150
D53 1SS133
D58 MA150
Q53 DTC144WF
Q54 DTC144F
Q56 N13T1
Q57 DTA144WF
Q59 DTA144WF
Q60 DTC144WF
Q61 DTA124F
IC2 BQ-050
VOLTAGE DROP DETECTOR(-ΔV)
Q14 2SD637R,S
Q7 2SD637R,S
RY1
RY2
D10 11E2
D21 1SS133
R36 0.47 1/2W
IC1 UPC1042C
OSC
5V REG
TFF
GATE
Q4 DTA144F
Q5 DTC144F
Q6 DTC144F
Q8 N13T1
REG 12V
VIDEO OUTPUT
AUDIO
VIDEO INPUT
CN13
CN15
CN10
CN16
CN12
CN11
CN17
CN7
CN9
EK:3P
BAND SEL 1
BAND SEL 2
TUNING PULSE
TUNER POWER CONTROL
MUTING
DEFEAT
AFC ERROR
SYNC DET
INFRARED RECIEVER
PHOTO
D3 PH302
L2 EG:100μ EK:1.5K
L1 100μ
D2 SLP-34VC12F
Q1 DTC144WF
Q3 DTC124F
INPUT SEL
AFC
TIMER
CHARGE
TU
LINE
ON
OFF
SW4
SW30
SW1
SW2
TP2
CLOCK
TEST
3-4
G
H
I
J
K
L
M
3-4
3-4

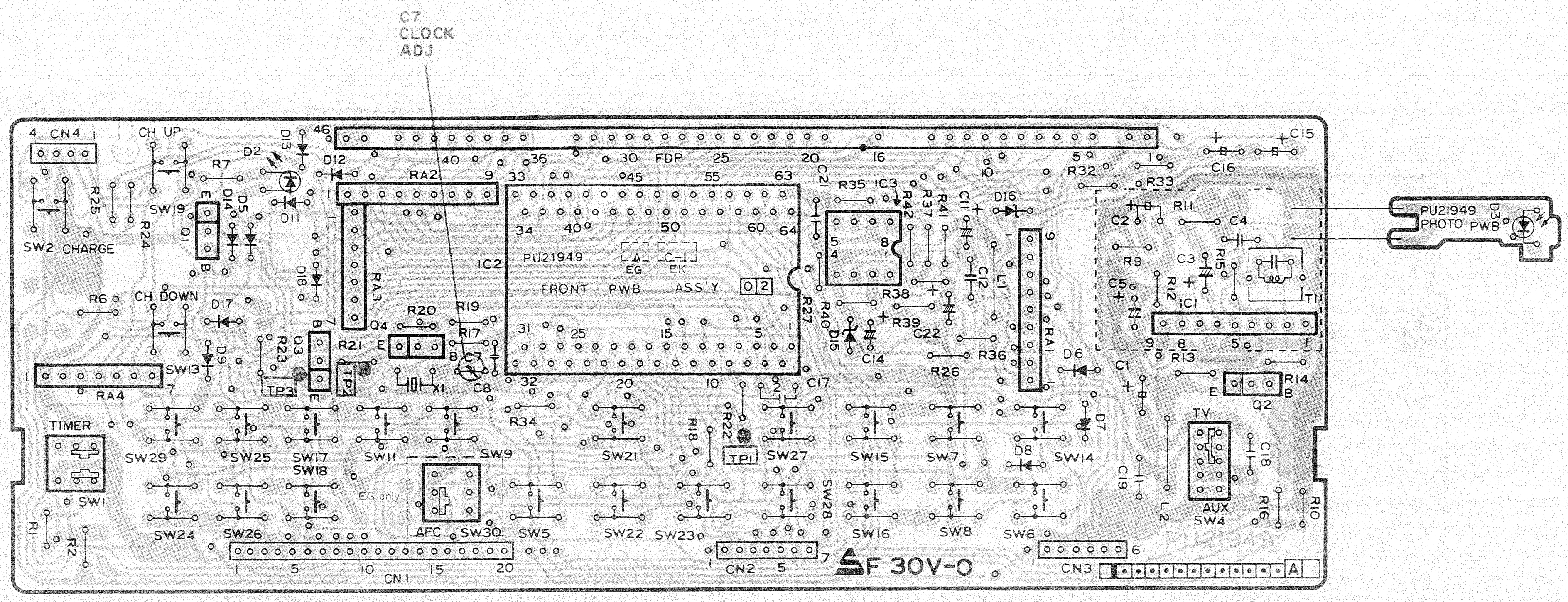
MULTI CONNECTOR (20pin) TO DECK

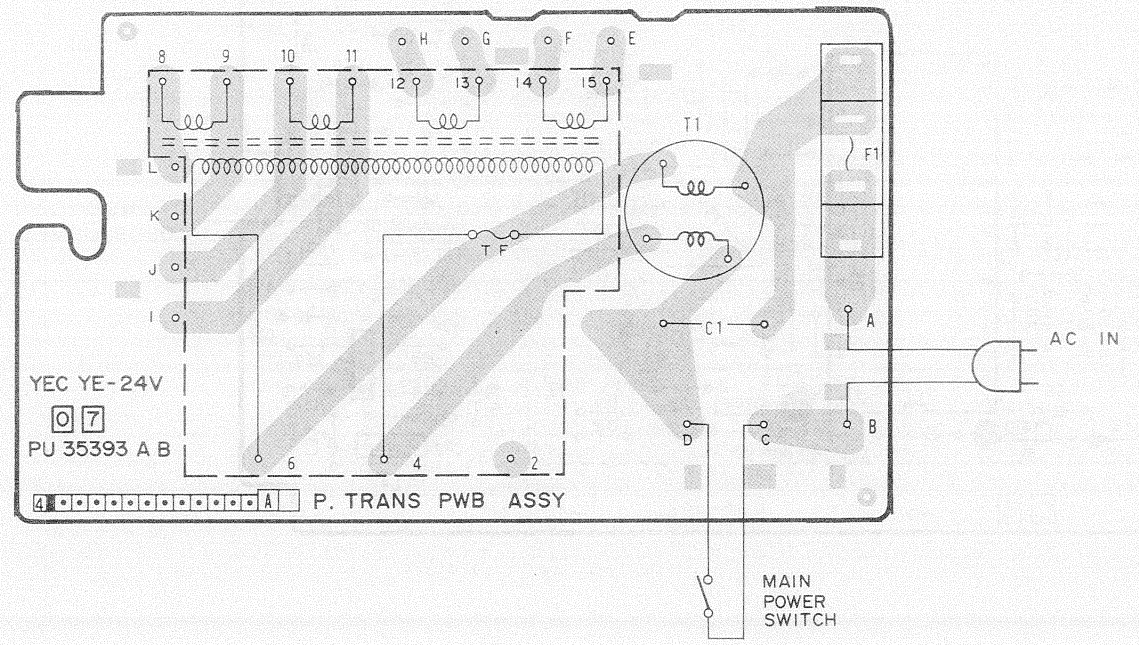
PIN NO	PIN NAME
1	AUDIO IN
2	AUDIO IN
3	GND (AUDIO)
4	GND (VIDEO)
5	CAMERA & PB LOW
6	TIMER REC OUT
7	12V OUT
8	GND (AUDIO)
9	AUDIO OUT
10	NC
11	TIMER SW(L) OUT
12	GND
13	REMOTE KEY SIG.
14	AUDIO OUT
15	POWER CTL IN
16	CHANNEL LOCK IN
17	VIDEO OUT
18	CHARG POWER OUT
19	VIDEO IN
20	GND (8+)


02 FRONT
CN4
TUNING PULSE
BAND SELECT 2
BAND SELECT 1
CN3
AC 4.3V (FILAMENT POWER)
-30V
REG 12V
GND
CHARGE LED DRIVE
IC 1
EG : UPC1373H (8pin)
EK : LA7225 (9pin)
Q2
2SA874Q,R
<AC4.3V W/MAINS PWR SW ON>
<-30V W/MAINS PWR SW ON>
<REG 12V W/MAINS PWR SW ON>
INFRARED RECIEVER
AMP
PEAK DET
W.F SHAPE
BIAS CONTROL
D5 PH302
EG : PU56056-4
EK : PU56056-3
FDP 1
1st 2nd SUN MON TUE WED THU FRI SAT REPEAT
START
TIMER
CLOCK
REC STOP
PROG
SET
CH
D16 HZ7B-1L
IC 54
TL066CP
IB1
RA53 33K X 3
D52 MA150
D53 1SS133
C60 0.47F/5.0 BACK-UP
CN2
SYNC DET(L)
CPU RESET(H)
BACK-UP 5V
MNOS MEMORY EM
AFC HIGH DET.(L)
AFC LOW DET.(L)
MEMORY CHIP ENABLE
<REMOTE KEY SIGNAL>
<SWD 5V>
L1 100μ
D2 SLR-34VC12F
Q1 DTC144WF
D51 LTZ-R15
RA52 33K X 5
IC 52
MN1219
CHANNEL DATA MEMORY
Q59 DTA144WF
RA51 100K X 4
TP2
RESET IN (H)
EM
CHIP ENABLE (L)
MODE ADDRESS DATA IN
DATA OUT
INPUT SEL
AFC
TIMER
CHARGE
SW4 LINE TU
SW30 ON OFF
SW1
SW2
2SD637R
Q4
TP 2 CLOCK
GND TP3
REPEAT
CANCEL
TIMER PROGRAM
CLOCK
CLOCK ADJ
TV-CH
PROG
STOP
START
MIN(-)
MIN(+)
HOUR
DAY
STORE
SKIP
CH SET
BAND U
BAND V(H)
BAND V(L)
FINE(+)
FINE(-)
CH UP(A)
CH DOWN(V)
D5-D9 D11-D14 MA167 D17,D18
RA1 33K X 8
RA2 33K X 8
RA4 100K X 6
IC 2
UPD7519H-013-36
SEGMENT & KEY DATA OUT
DATA OUT
KEY DATA IN
DATA I/O
DIGIT CONTROL OUT
SYNC DATA
AFC L
AFC H
TEST(L)
RESET(H)
DISPLAY DRIVE POWER
CHANNEL MEMORY DATA OUT
INTERRUPT (BRAKE-DOWN)
BAND SEL
MUT
DEFEAT
X1 4.19430MHz
TP 1 TEST
IC 51
MB8854M-469L
TP 1 TEST
POWER CTL IN
INPUT SEL IN (PICTURE)
DATA ENABLE
REMOTE KEY DATA IN
TIMER SW IN
BATT CHARGE DET IN
CHANNEL LOCK
CHARGE CTL OUT
RF SW CTL OUT
TIMER SEL OUT
CHARGE LED OUT
RESET IN
X-COM CLOCK
X1 4.0MHz
CN1
MNOS MEMORY DATA 3
MNOS MEMORY DATA 2
MNOS MEMORY DATA 1
MNOS MEMORY DATA 0
5V
DATA ENABLE
DATA 3
DATA 2
DATA 1
DATA 0
CHARGE SWITCH
MUTE
AFC DEFEAT
GND
REMOTE KEY SIGNAL
TIMER SWITCH (L)
REMOTE KEY SIGNAL
INPUT SELECT (H: TUNER)
EK ONLY
Q3 DTC124F
<30V W/MAINS PWR SW ON>
RA3 33K X 6
D15 RD4.3EB
IC 3
TL066CP
R37 820K
<BACK-UP 5V>
<REG 12V W MAINS PWR SW ON>
K
L
M
3-4
3-4
O
P
Q
R

3.4 BOTTOM/FRONT/POWER TRANSFORMER BOARD


0 1 BOTTOM PWB ASS'Y PU11077 A B
EG EK
YEC YE-34V
BOTTOM PWB PU11077 -1-4
EG:2pin EK:3pin
CN1
CN2
CN3
CN6
CN7
CN9
IC2
IC51
IC52
IC53
IC54
F3
F4
F5
TP1
TP2
PU11077 A3 B3
BOTTOM PWB ASS'Y
(TERMINAL)
0 8
VIDEO IN
VIDEO OUT
DIN
YEC YE-34V
CN13
CN15
PU11077 A2
0 6
REG 12V ADJ
YEC YE-34V
BOTTOM SUB PWB ASS'Y
4 CN4
SW2 CHARGE
TIMER
SW1
RA4
YEC YE-24V
0 7
PU 35393 A
6
5
4
3
2
1
A
B
C
3-5
3-5
E
F
G
H

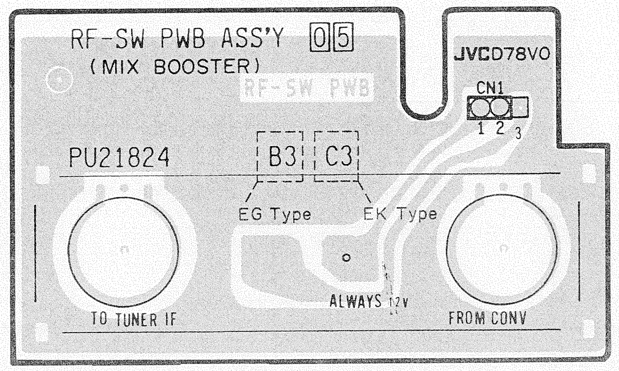

C7
CLOCK
ADJ
CN4
CH UP
CH DOWN
SW2 CHARGE
TIMER
SW1
FDP
IC2
PU21949
FRONT PWB ASS'Y
EG
EK
02
IC3
IC1
T1
TV
AUX
SW4
EG only
AFC
SW30
CN1
CN2
CN3
F 30V-0
PU21949
PU21949
PHOTO PWB
D3
C15
C16
TP1
TP2
TP3
X1
Q1
Q2
Q3
Q4
RA1
RA2
RA3
RA4

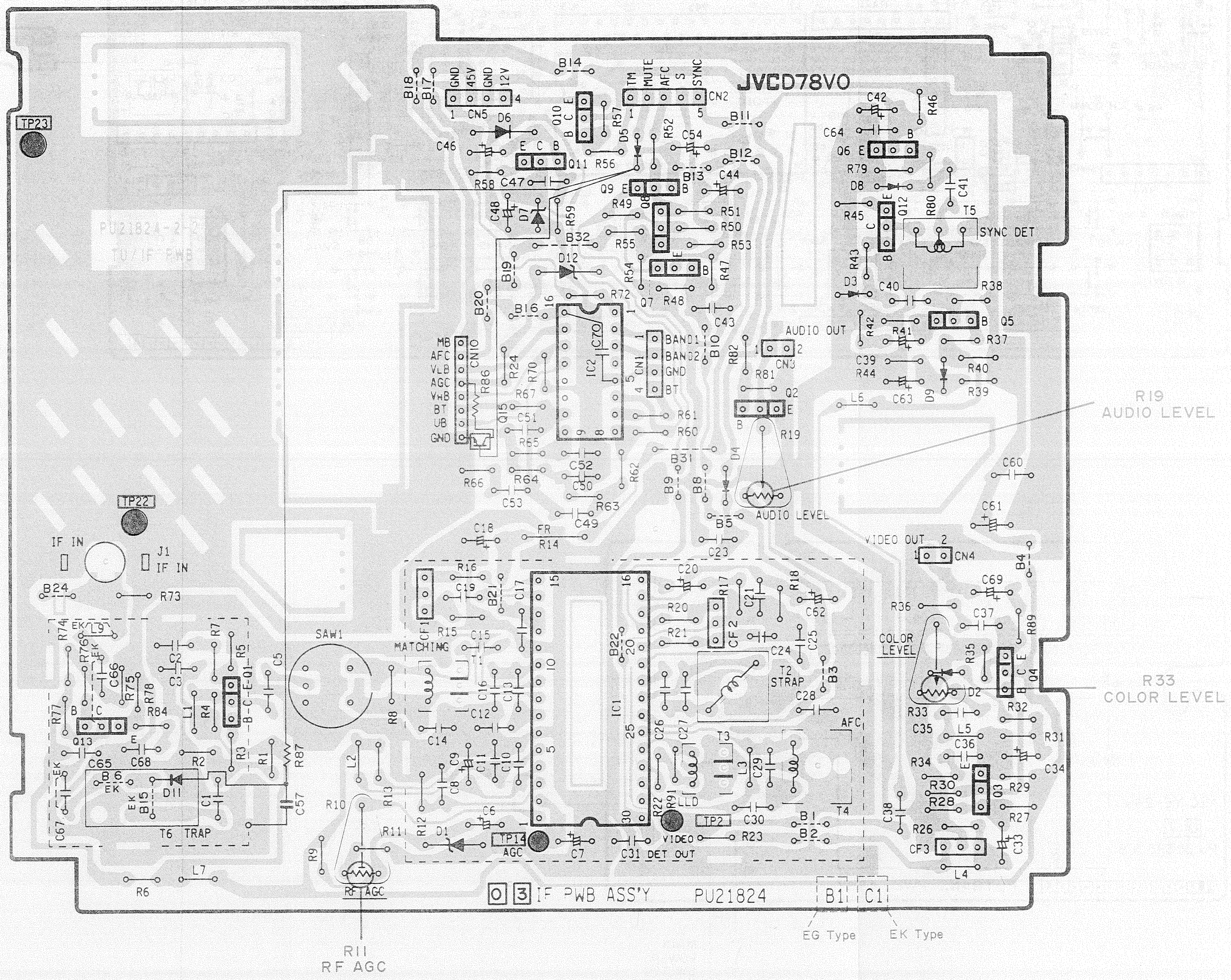

T1
F1
TF
C1
A
B
C
D
AC IN
MAIN
POWER
SWITCH
YEC YE-24V
07
PU 35393 A B
P. TRANS PWB ASSY

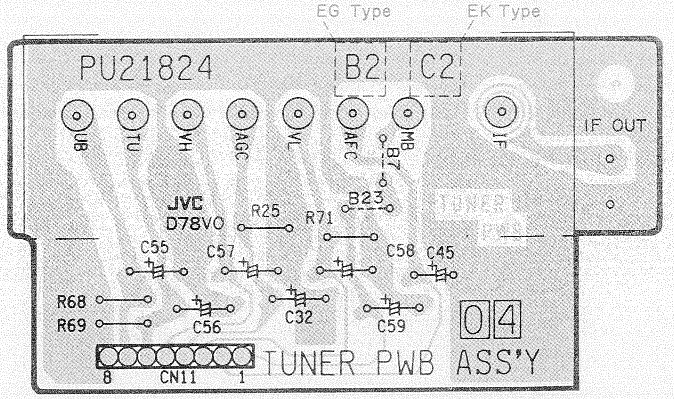
H I J K 3-5 3-5 M N O P

3.5 TUNER/IF BOARD

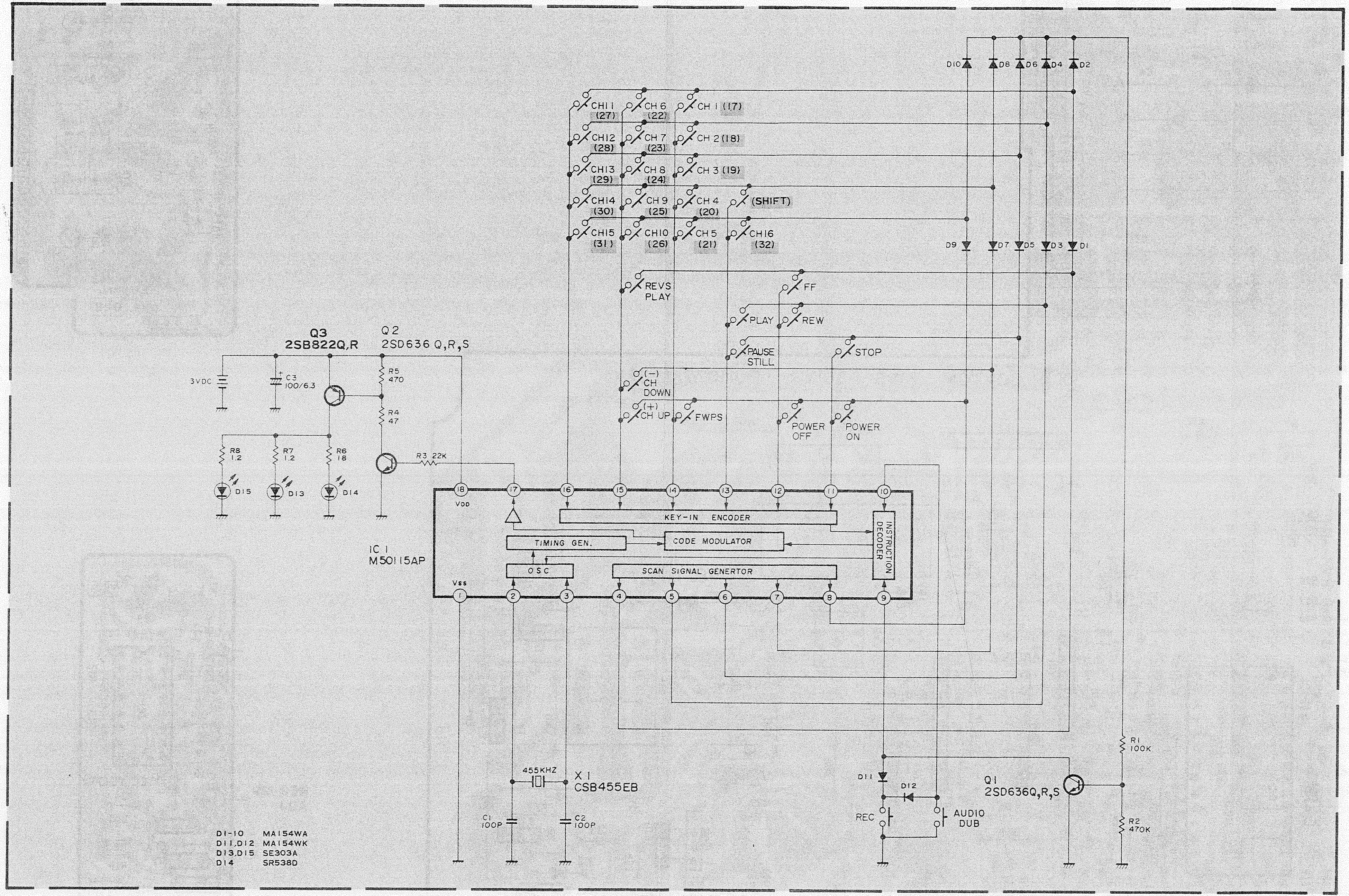
3.6 RE


RF-SW PWB ASS'Y 05
(MIX BOOSTER)
JVC D78VO
CN1
PU21824
B3
C3
EG Type
EK Type
ALWAYS 12V
TO TUNER IF
FROM CONV


JVC D78VO
TP23
TP22
IF IN
J1 IF IN
CN5 GND 45V GND 12V
CN2 TM MUTE AFC S SYNC
CN10 MB AFC VLB AGC VHB BT UB GND
CN1 BAND1 BAND2 GND BT
IC2
IC1
AUDIO OUT CN3
SYNC DET
VIDEO OUT CN4
SAW1
MATCHING
T2 STRAP
T6 TRAP
TP14 AGC
TP2
VIDEO
DET OUT
LLD
AFC
AUDIO LEVEL
COLOR LEVEL
RF AGC
R19 AUDIO LEVEL
R33 COLOR LEVEL
R11 RF AGC
03 IF PWB ASS'Y PU21824
B1 C1
EG Type
EK Type


PU21824
B2
C2
EG Type
EK Type
UB
TU
VH
AGC
VL
AFC
MB
IF
IF OUT
JVC D78VO
CN11
04 TUNER PWB ASS'Y

3.6 REMOTE CONTROLER SCHEMATIC DIAGRAM


D10
D8
D6
D4
D2
CH11 (27)
CH 6 (22)
CH 1 (17)
CH12 (28)
CH 7 (23)
CH 2 (18)
CH13 (29)
CH 8 (24)
CH 3 (19)
CH14 (30)
CH 9 (25)
CH 4 (20)
(SHIFT)
CH15 (31)
CH10 (26)
CH 5 (21)
CH16 (32)
D9
D7
D5
D3
D1
REVS PLAY
FF
PLAY
REW
PAUSE STILL
STOP
(−) CH DOWN
(+) CH UP
FWPS
POWER OFF
POWER ON
Q3
2SB822Q,R
Q2
2SD636 Q,R,S
3VDC
C3 100/6.3
R5 470
R4 47
R8 1.2
R7 1.2
R6 18
D15
D13
D14
R3 22K
VDD
IC 1
M50115AP
VSS
KEY-IN ENCODER
TIMING GEN.
CODE MODULATOR
INSTRUCTION DECODER
OSC
SCAN SIGNAL GENERTOR
18
17
16
15
14
13
12
11
10
1
2
3
4
5
6
7
8
9
455KHZ
X 1
CSB455EB
C1 100P
C2 100P
D11
D12
REC
AUDIO DUB
Q1
2SD636Q,R,S
R1 100K
R2 470K
D1-10 MA154WA
D11,D12 MA154WK
D13,D15 SE303A
D14 SR538D

(▨) EG only

R19
IO LEVEL

R33
OR LEVEL

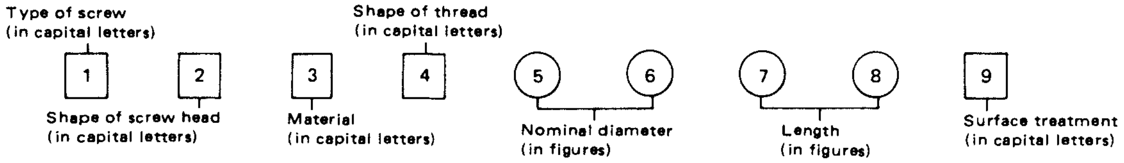
SECTION 4
EXPLODED VIEWS AND PARTS LIST

SAFETY PRECAUTION

Parts identified by ⚠ symbol are critical for safety. Replace only with specified aprt numbers.

4.1 STANDARD PART NUMBER CODING (Screw coding)

Standard screw part numbers are as follows.


Type of screw
(in capital letters)
Shape of thread
(in capital letters)
1
2
3
4
5
6
7
8
9
Shape of screw head
(in capital letters)
Material
(in capital letters)
Nominal diameter
(in figures)
Length
(in figures)
Surface treatment
(in capital letters)

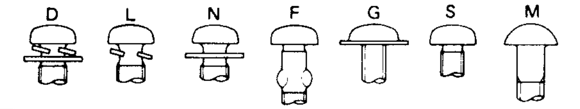
Type of screw (first digit)

S	Normal screws
D	Assembled machine screws (with plain and spring washers)
L	" (with spring washer)
N	" (with plain washer)
F	Feather screws
G	Washer head tapping screws
M	Wood screws

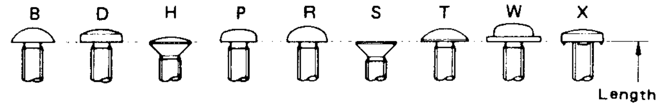
Shape of screw head (second digit)

B	Brazier head
D	Binding head
H	Oval countersunk head
P	Pan head
R	Round head
S	Flat head
T	Truss head
W	Washer head (machine screws)
X	Toothed head

—Type of screw (first digit) —



— Shape of screw head (second digit) —


B
D
H
P
R
S
T
W
X
Length

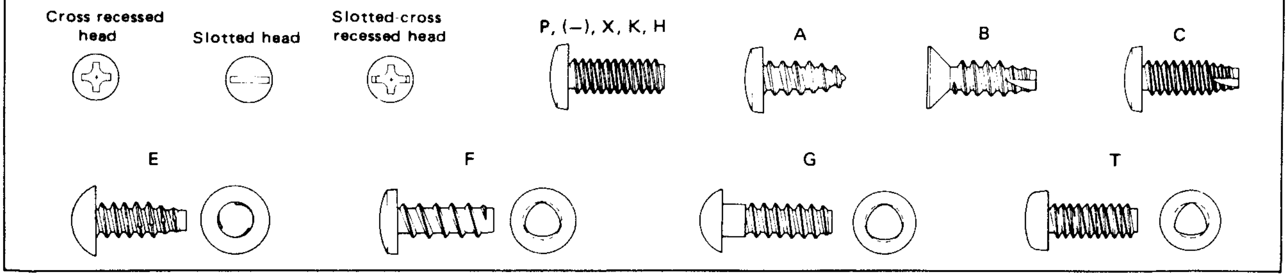
Material (third digit)

S	Steel	N	Nickel silver
E	Stainless steel	Y	Cast brass
C	Cast iron	A	Aluminum
U	Copper	Z	Zinc alloy
B	Brass	K	Polycarbonate
P	Phosphor bronze		

Shape of thread (fourth digit)

P	Cross recessed head screws
(–)	Slotted head machine screws
X	Slotted-cross recessed head machine screws
K	Cross recessed head machine screws for precision equipment (type 1)
H	" (type 3)
A	Cross recessed head tapping screws (type 1)
B	" (type 2)
C	" (type 3)
E	Cross recessed head special tapping screws (brand : evertight)
F	" (brand : P-tight)
T	" (brand : taptight)
G	"

— Shape of thread (fourth digit) —


Cross recessed
head
Slotted head
Slotted-cross
recessed head
P, (–), X, K, H
A
B
C
E
F
G
T

Nominal diameter (fifth and sixth digits)

The fifth and sixth digits are numbers indicating a nominal diameter or dimension. If the dimension exceeds 10 mm, three digits are used. The number indicates a nominal diameter or dimension, given in millimeters, multiplied by ten.

Length (seventh and eighth digits)

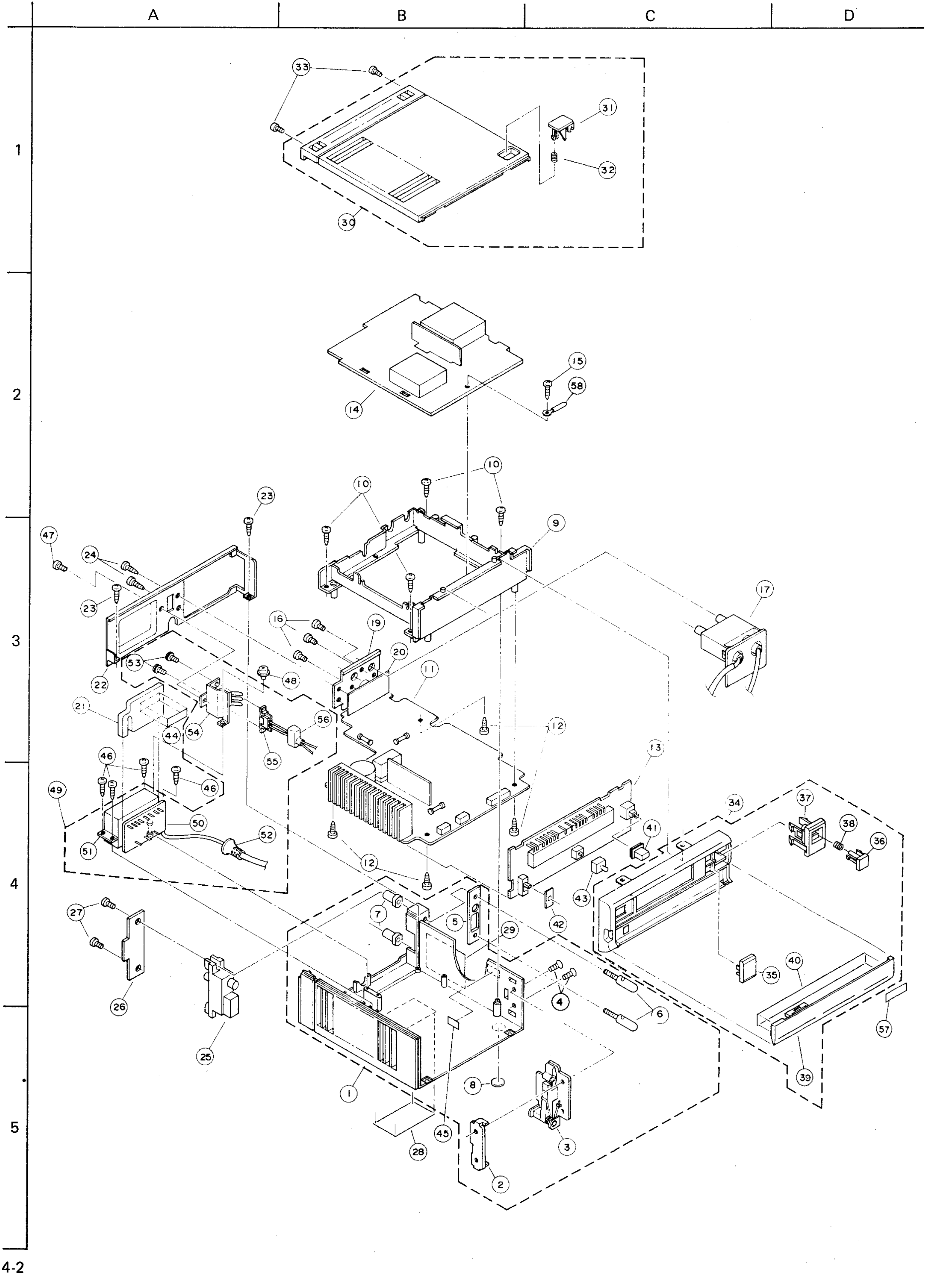
The seventh and eighth digits are numbers indicating length in milimeters. The preceding figure is zero when the dimension is smaller than 10 mm. For machine screws used in precision equipment whose length is given in units of 0.1 mm, the number indicates ten times the size of their length.

Surface treatment (ninth digit)

Z	Dichromate treatment after galvanizing (MFZn II-C)
N	Nickel plating (MFNi II, MFNi I)
R	Chromium plating (MBCr II, MBCr I)
G	Silver plating (SP4)
B	Black coating after plating
F	Blackening of iron (FB)
M	Blackening after galvanizing
K	Pickling of brass (PF2)
P	Phosphate treatment
W	Uni-chrome plating
L	Coating with transparent paint
A	Coloring red after galvanizing (MFZn II-C)
C	Coloring blue after galvanizing (MFZn II-C)
T	Coloring green after galvanizing (MFZn II-C)
V	Coloring purple after galvanizing (MFZn II-C)

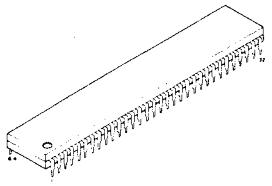
4.2 EXPLODED VIEWS AND PARTS LIST

4.2.1 Cabinet and chassis assembly

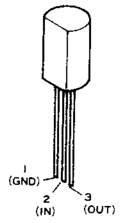

A
B
C
D
1
2
3
4
5
33
31
32
30
15
58
14
10
23
9
47
24
23
17
16
19
20
11
53
48
22
21
56
12
44
54
55
13
46
49
46
34
37
38
36
50
41
52
51
12
43
42
4
27
7
5
29
26
35
40
4
6
57
25
39
8
1
3
45
28
2

– MECHACON –

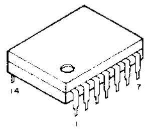
HD6305XOA32P



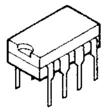
S-81250HG


1 (GND)
2 (IN)
3 (OUT)

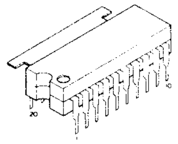
IR3702



BA728



BA6109U3



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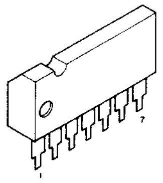
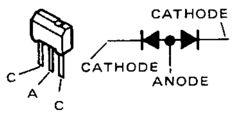
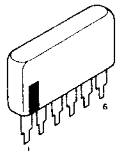


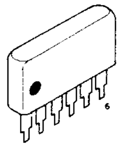
DAP201


CATHODE
CATHODE
ANODE
C
A
C

EXB-LD4103G



RGLD6X472G



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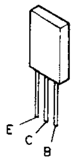
2SC3400
2SA1175



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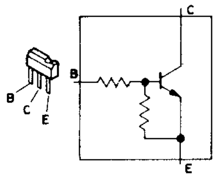

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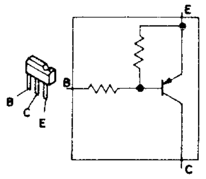
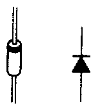
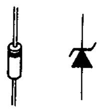


1SS133



RD2.7EB1
RD3.3EB1
RD5.1EB1
RD8.2EB3
RD12EB1



– SERVO –

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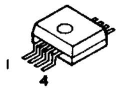

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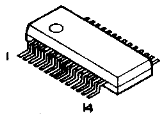

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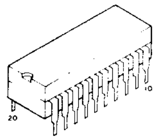

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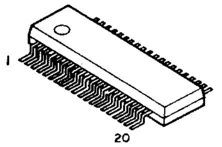
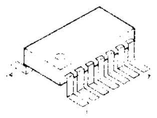


UPD4066BG
UPC451G



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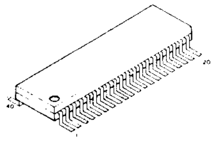
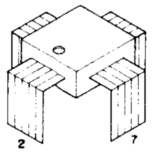


HA11780MP



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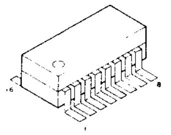
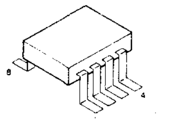


UPC277G



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DTC124KT
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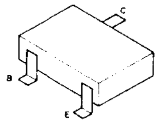
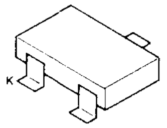
2SC2412KT



DAP202KT
DA204KT
DAN202KT



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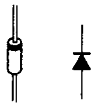
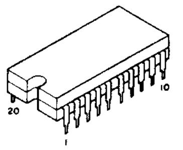


– AUDIO –

AN3991K



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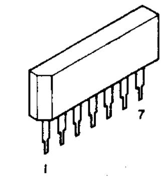

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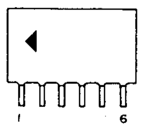

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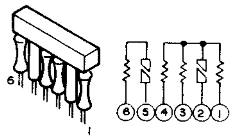

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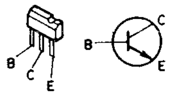
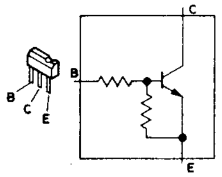


DTC144F



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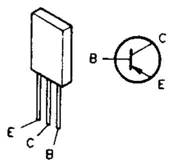

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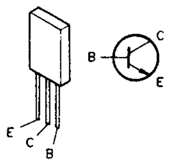
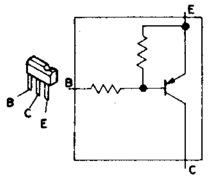


DTA124F



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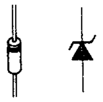

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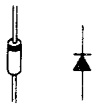
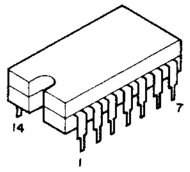
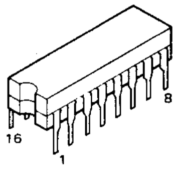


– VIDEO –

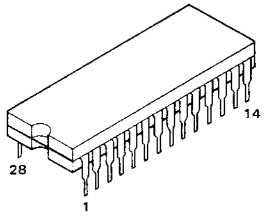
T8004



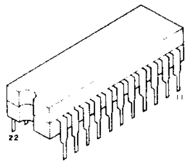
TL8704P



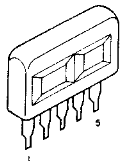
HA11756



AN6327
AN6306



5VT07



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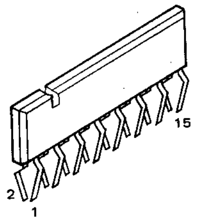
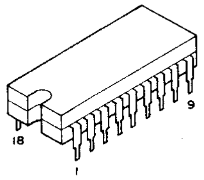


AN6393



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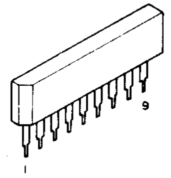
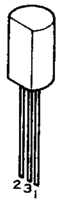
AN6913



M5236L
TA75393S



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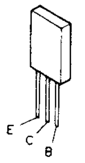
2SA1346
2SC2785HF,FF,EF
2SC3400
2SC2787LF



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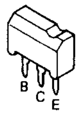
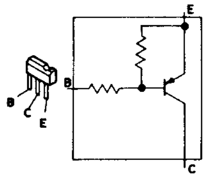
2SC2021Q,R,S
2SD1055P,Q



DTA144F



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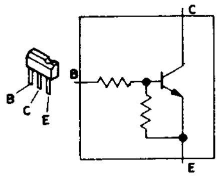
DTC144F



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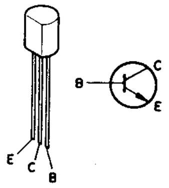

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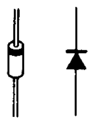

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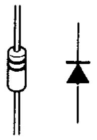

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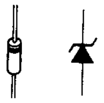

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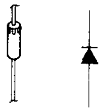

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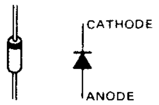
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ANODE

– MDA –

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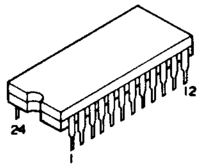

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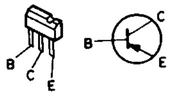

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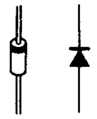

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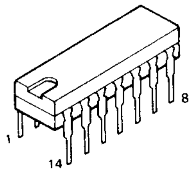

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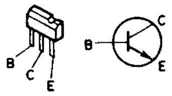

– OSC –

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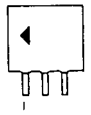

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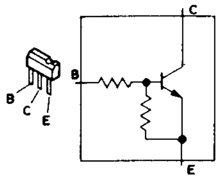

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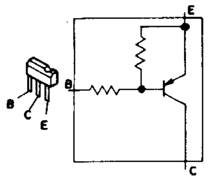


4-3

4.3 KEY TO ABBREVIATIONS

A	AC	: Alternating Current
	ACC	: Automatic Color Control
	A/CTL	: Audio/Control
	ADD	: Adder
	ADC	: Analog to Digital Converter
	ADJ	: Adjustment
	A DUB	: Audio Dub
	AE	: Audio Erase
	AEF	: Automatic Editing Function
	AFC	: Automatic Frequency Control
	AFT	: Automatic Fine Tuning
	AGC	: Automatic Gain Control
	AH	: Audio Head
	AHD	: Audio High Density
	AL	: After Loading
	ALC	: Automatic Light Compensation Automatic Level Control
	A/S/M	: Audio/Servo/Mechacon
	ALM	: Alarm
	ALU	: Arithmetic Logic Unit
	AM	: Amplitude Modulation
	AMP	: Amplifier
	ANT	: Antenna
	APC	: Automatic Pedestal Control Automatic Phase Control
	APL	: Average Picture Level
	ASS'Y	: Assembly
	ATT	: Attenuator
	AUTO	: Automatic
	AUX	: Auxiliary
	AUD	: Audio
B	B	: Base
	BAL	: Balance
	BATT	: Battery
	BBD	: Bucket Brigade Device
	BCD	: Binary Coded Decimal
	BEG	: Beginning
	BFP	: Burst Flag Pulse
	BUFF	: Buffer
	BIT	: Binary Digit
	BLK	: Black
	BLU	: Blue
	BNC	: Bayonet Connector
	BOT	: Beginning of Tape
	BPF	: Bandpass Filter
	BRK	: Brake
	BRN	: Brown
	BRT	: Brightness
	BT	: Band Tuning
	BW or B/W	: Black and White
C	C	: Capacitance
	CAP	: Capstan
	CAR	: Carrier
	CASS	: Cassette
	CCT	: Circuit
	CdS	: Cadmium Sulphide
	CD	: Countdown
	CF	: Ceramic Filter, Color Frame
	CC	: Cassette Compartment
	CE	: Chip Enable
	CH	: Channel
	CHG	: Charge
	CHROMA	: Chrominance
	CLK	: Clock
	CLR	: Clear
	CMOS	: Complementary Metal Oxide Semiconductor
	CMD	: Command
	CNT	: Count, Counter
	CONV	: Converter
	COL	: Color
	COM	: Common
	COMB	: Combination Comb Filter
	COMP	: Comparator Composite Compensation
	CONN	: Connector
	CPC	: Capstan Phase Control
	CTC	: Crosstalk Cancel
	CPU	: Central Processing Unit
	CTL	: Control
D	D	: Drum
	DAC	: Digital to Analog Converter
	dB	: Decibel
	DC	: Direct Current
	DD	: Direct Drive
	DEC	: Decoder
	DEMOD	: Demodulator
	DEMUX	: Demultiplexer
	DET	: Detector
	DEV	: Deviation
	DFRS	: Drum Free RUN STOP
	DIF TRANS	: Differential Transformer
	DISCR	: Discriminator
	DL	: Delay Line
	DOC	: Dropout Compensator
	DPC	: Drum Phase Control
	DYAC	: Dynamic Aperture Control
E	E	: Edit
	EDP	: Electronic Da a Processing
	E-E	: Electric to Electric
	EF	: Emitter-Follower
	EMP	: Emphasis
	ENC	: Encoder
	EN	: Enable
	ENV	: Envelope
	EOT	: End of Tape
	EP	: Extended Play
	EQ	: Equalizer
	ES	: Electronic Switch
	ESNS	: End Sensor
	EXP	: Expander
	EXT	: External
F	F	: Farad
	F ADV	: Frame Advance
	FDP	: Fluorescent Display Panel
	FE	: Full Erase
	FET	: Field Effect Transistor
	FF	: Fast Forward Flipflop
	FG	: Frequency Generator
	FM	: Frequency Modulation
	FMA	: FM Audio
	FR	: Full Recording, Frame
	FREQ	: Frequency
	F-V CONV	: Frequency to Voltage Converter
	FWD	: Forward
	FWD S	: Forward Search
G	G	: Green
	GEN	: Generator
	GND	: Ground
	GRN	: Green
	GRY	: Gray
H	H	: High
	HBF	: Horizontal Burst Flag
	HD	: Horizontal Drive
	HG	: Hall Generator
	HPF	: Highpass Filter
	Hz	: Herz
I	IC	: Integrated Circuit
	ID	: Identification (Pulse)
	IF	: Intermediate Frequency
	IFR	: Infrared
	IFT	: Intermediate Frequency Transfomer
	IND	: Indicator
	INH	: Inhibit
	INS	: Insert
	INT	: Internal, Interrupt
	INV	: Inverter
	I/O	: Input/Output
	IR	: Infrared
L	L	: Low
	LED	: Light Emitting Diode
	LIN	: Linearity
	LIM	: Limiter
	LOAD	: Loading (Cassette)
	LP	: Long Play
	LPF	: Lowpass Filter
	LSB	: Lower Sidedband
M	M	: Motor
	MAX	: Maximum
	MDA	: Motor Drive Amplifier
	MECHACON	: Mechanism Control
	MIC	: Microphone
	MIN	: Minimum
	MIX	: Mixer
	MMV	: Monostable Multivibrator
	MOD	: Modulation
	MODEM	: Modulator-Demodulator
	MON	: Monitor
	MOS	: Metal Oxide Semiconductor
	MPX	: Multiplexer
	MS	: Mode Select
	MUT	: Muting
N	NAND	: Not-And
	NC	: Not Connected
	NFB	: Negative Feedback
	NLN	: Non-Linear
	NO	: Normally Open
	NOR	: Normal
O	OPAMP	: Operational Amplifier
	OP	: Operation
	ORN	: Orange
	OSC	: Oscillator
P	PB	: Playback
	PC	: Photocoupler, Pulse Counter
	PCM	: Pulse Code Modulation
	PGM	: Program
	PG	: Pulse Generator
	PI	: Photo Interrupter
	PLL	: Phase Locked Loop
	p-p	: Peak-to-Peak
	POS	: Position
	PR	: Pinch Roller
	PREAMP	: Preamplifier
	PRL	: Preroll
	P/S	: Pause/Still
	PSC	: Pulse Swallowing Control
	PU	: Pickup
	PWB	: Printed Wiring Board
	PWM	: Pulse Width Modulation
	PWR	: Power
Q	Q	: Quality Factor
R	R	: Red
	RA	: Resistor Array
	RAM	: Random Access Memory
	REC	: Recording
	REG	: Regulated
	REM	: Remote
	REMOCON	: Remote Control (Unit)
	REV	: Reverse
	REV S	: Reverse Search
	REW	: Rewind
	RF	: Radio Frequency
	RS FF	: RS Flipflop
	RST	: Reset
	R/P	: Record/Playback
	RPT	: Repeat
	RT	: Rotary Transformer
	RUN	: Running
	RY	: Relay
S	SC	: Subcarrier, Simulcast
	SAW	: Sawtooth
	SCH	: Search
	SEL	: Select
	SENS	: Sensor
	SEP	: Separator
	SF	: Source Follower
	SFF	: Short Fast Forward
	SIF	: Sound Intermediate Frequency
	SN	: Signal to Noise Ratio
	SOL	: Solenoid
	SOS	: Sound on Sound
	SP	: Standard Play
	SR	: Supply Reel
	SREW	: Short Rewind
	S/S	: Slow/Still
	SSG	: Sync Signal Generator
	SSNS	: Start Sensor
	STD	: Strobe Data
	SUP	: Supply
	SW	: Switch
	SWD	: Switched
	SYNC	: Synchronization
	SYSCON	: System Control
T	TBC	: Time Base Corrector
	TP	: Test Point
	TPZD	: Trapezoid
	TR	: Transistor; Transformer
	TU	: Take-Up
	TC	: Tension Control, Time code
	TAL	: Tally
	TEN	: Tension
	TK	: Tracking
	TIM	: Timing
	T/T	: Tuner/Timer
U	UL	: Unloading
	UNREG	: Unregulated
	UNSW	: Unswitched
V	V	: Volt
	V	: Volt
	VACT	: Video Action
	VCO	: Voltage Controlled Oscillator
	VD	: Vertical Drive
	VIF	: Video Intermediate Frequency
	VR	: Variable Resistor
	VS	: Video and Sync
	VXO	: Variable Crystal Oscillator
	VLT	: Violet
	V/T	: Video/Television
	V/U	: VHF/UHF
	VSCH	: Variable Search
W	W	: Watt
	WHT	: White
	WV	: Working Voltage
	W & D	: White and Dark
	WARN	: Warning
X	XTAL	: Crystal
Y	Y	: Luminance
	YEL	: Yellow

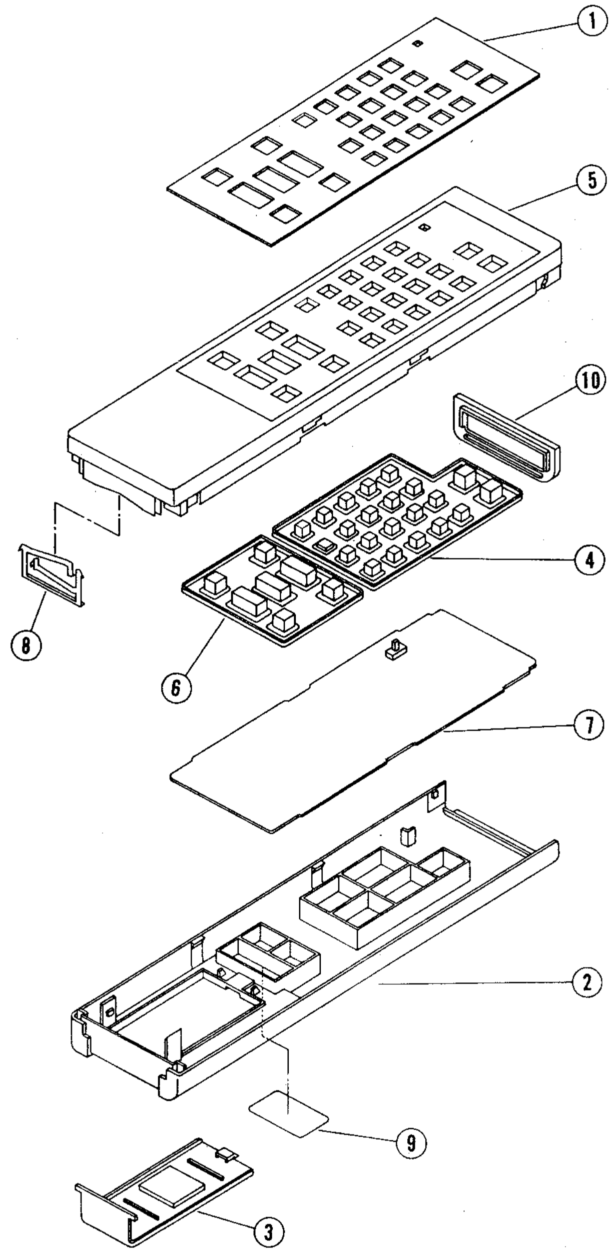
– Cabinet and chassis assembly list –

Symbol No.	Part No.	Part Name	Description	Symbol No. Position	Q'ty
1	PU10923F-8	Bottom Cover Ass'y	Incl. ② – ⑧	5-B	1
2	PU57209	Joint Bracket		5-B	1
3	PU34869A-2	Lock Lever Ass'y		5-C	1
4	SSSP3006M	Screw		4-C	2
5	PU56626	Joint Plate		4-B	1
6	PU56627	Joint Stud		5-C	2
7	PU56628	Joint Collar		4-B	2
8	PU56621	Foot		5-B	4
9	PU21821-1-9	Chassis		3-C	1
10	SDSA3010Z	Tap Screw		2-B	4
11	–	Bottom Board Ass'y	See Section 5.1.1	3-B	1
12	SDSA3010Z	Tap Screw		3-C, 4-B	4
13	–	Front Board Ass'y	See Section 5.1.2	3-C	1
14	–	TU/IF Board Ass'y	See Section 5.1.3, 5.1.4	2-B	1
15	SDSA3010Z	Tap Screw		2-C	1
16	SDSP3006M	Screw		3-B	3
17	–	RF SW (Mix Booster) Board Ass'y	See Section 5.1.5	3-C	1
18	–	–		–	–
19	PQ30454-1-2	Terminal Plate	EG	3-B	1
	″ -2-2	″	EK	3-B	1
20	–	Terminal Baord Ass'y	See Section 5.1.8	3-C	1
⚠ 21	PU34910	AC Cover		3-A	1
22	PU34793-2	Rear Panel	EG	3-A	1
	″ -3	″	EK	3-A	1
23	SDSA3008Z	Tap Screw		2-A, 3-A	1
24	SBSE3008M	″		3-A	2
25	PU56547-2	Multi Connector Ass'y		5-A	1
26	PU34792	Cover		5-A	1
27	SDSP3006M	Screw		4-A	2
⚠ 28	PQ30256-14	Rating Label	EG	5-B	1
⚠	″ -16	″	EK	5-B	1
29	PU34926-4	Connector Label	EG	4-B	1
	″ -5	″	EK	4-B	1
⚠ 30	PU10927H-3	Top Cover Ass'y	EG Incl. ㉛ , ㉜	1-B	1
⚠	″ G-3	″	EK	1-B	1
31	PU34832-8-3	Button	EG	1-C	1
	″ -7-3	″	EK	1-C	1
32	PQM30002-61	C. Spring	for ㉛	1-C	1
33	SDSP3006M	Screw		1-B	2
⚠ 34	PU10925G-6	Front Cover Ass'y	EG Incl. ㉟ – ㊵	4-C	1
⚠	″ J-6	″	EK	4-C	1
35	PU34824-3	Knob	EG KANAL	4-D	1
	″ -2	″	EK CHANNEL	4-D	1
36	PQ30446	Button	EG LADEN	4-D	1
	″ -2	″	EK CHARGE	4-D	1
37	PQ30445	″	DUMMY	4-D	1
38	PQM30002-173	C. Spring	for ㊱	4-D	1
39	PU34831-7-5	Door	EG	5-D	1
	″ -9-5	″	EK	5-D	1
40	PU35119-2	Door Plate		4-D	1
41	PU34865	Button	TIMER	4-C	1
42	PU57878	Shutter		4-C	1
43	PU34864	Button	EG AFC	4-C	1
⚠ 44	PU56988	Caution Label		3-A	1
45	PU50487	No. Plate		5-B	1
46	SDSA4012Z	Tap Screw		3-A, 4-A	4
47	SDSP3008M	Screw		3-A	1
48	GPST3006Z	Tap Screw		3-B	1
⚠ 49	PU35393A	Power Trans Ass'y	EG Incl. ㊿ – (56)	4-A	1
⚠	PU35393B	″	EK Incl. ″	4-A	1
50	–	Power Trans Board Ass'y	See Section 5.1.7	4-A	1
⚠ 51	PU57374	Power Trans	EG	4-A	1
⚠	PU57375	″	EK	4-A	1
⚠ 52	QMP3960-200A	Power Cord	EG	4-A	1
⚠	QMP5110-200A	″	EK	4-A	1
⚠ 53	LPSP3006Z	Screw		3-A	2
54	PQ41422A	Holder Ass'y		3-A	1
⚠ 55	QSE1135-007	See-SAW Switch		3-A	1
⚠ 56	PU50479	Switch Cover		3-B	1
57	PU51630	Sticker	EK	5-D	1
58	PU49485	Wire Clamp		2-C	1

4.2.2 Remote control unit assembly

	A	B	C	D

– EG –


1
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1
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5

4.4 MECHACON OPERATION/MODE SHIFT TABLE

4.4.1 After Power ON

1. The STOP LED lights (to provide power ON indication).
2. Stop mode is entered.
3. If tape is loaded, unloading is performed, then the Stop mode entered.
4. If REC Lock has been set, the REC Pause mode is entered.

4.4.2 Conditions Yielding Stop Mode

1. The Stop mode is entered automatically when the leader or trailer tape at the beginning or end of the tape is detected.
2. The battery graphic of the counter display flashes when the power supply voltage at Mechacon board TP1 declines to approximately 11 V. Further decline to approximately 10.5 V yields the Stop mode, after which power is cut off.
3. In event of moisture condensation, the droplet graphic of the counter display flashes and all operations are inhibited. All mode indicating LEDs extinguish.
4. If Pause operation (i.e., REC Pause, A. DUB Pause, Insert Pause, or Still) continues for longer than approximately 5 minutes, the Stop mode is entered automatically.
5. With the counter MEMORY switch ON (M graphic displayed) in the Fast Forward or Rewind mode, the Stop mode is entered when the counter display coincides with the value at the time the MEMORY switch was set.

4.4.3 Warning Indication

If the REC Safety switch is open (cassette tab absent) during Timer Recording, the PLAY LED flashes.

4.4.4 Emergency Mode Conditions

In this state, the Stop mode is first entered and the corresponding LED flashes for approximately 10 seconds, then power is cut off.

1. If more than about 10 seconds elapse before completion of loading or unloading. The REV PLAY LED flashes.
2. After pressing an operation button, if more than 10 seconds elapse before shifting to the selected mode. The STILL/PAUSE LED flashes.
3. During REC, Play, Audio Dub, Insert, Frame Advance, FF, or REW mode, if take-up disk rotation stops for 2 to 7 seconds. In the Reverse Play mode, this applies to the supply reel disk. The INSERT LED flashes.
4. Absence of the drum flip-flop input for 4 to 6 seconds in modes when the head drum should be rotating (i.e., Loading, Recording, Play, Reverse Play, Audio Dub, Insert and Still/Pause). The REW LED flashes.

WARNING/EMERGENCY TABLE

No.	CAUSE	INDICATOR	Final CONDITION
1	Battery voltage down	(▮) sign on the counter display starts to flash.	All indicator LEDs turn OFF
2	Moisture condensation	(💧) sign on the counter starts to flash.	All indicator LEDs turn OFF
3	Loading/unloading failure	The REV, PLAY, LED starts to flash	Power OFF
4	Mode shift function failure	The PAUSE/STILL LED starts to flash	Power OFF
5	Missing Reel FG. pulse	The INSERT LED starts to flash	Power OFF
6	Missing Drum pulse	The REW LED starts to flash	Power OFF

4.4.5 REC Lock Operation

In the REC Pause mode, setting power OFF, then returning power ON yields the REC Pause mode.

1. This function is performed only when tape is loaded. The Pause mode is entered for approximately two seconds, then Play-back is performed for about one second. Afterwards, the Recording mode is entered.
2. In the REC Lock state, with the camera at stand-by (Camera Pause), return of power yields the REC Pause mode.
3. In the case of the GZ-S3, the Pause mode is entered. The Recording mode is not obtained unless the START switch is set to ON.
4. With camera models that hold the START switch position, after return of power, operation is as described in above 1.

4.4.6 Timer Switch ON (TU-S10 Connected)

1. With the TU-S10 connected for timer recording (TIMER switch ON), the Recording mode is entered when the "TIMER REC" High potential output is obtained from the TU-S10 CPU.
   - * From the Stop state, loading is performed, then the Recording mode entered.
   - * In the REC Lock setting, the Recording mode is entered immediately.
   - * At completion of timer recording, back-space is performed, then the power is cut off in the REC Pause state.
2. While timer recording is in progress, key button operations are inhibited.
3. During timer recording of a camera signal, the Recording mode is entered even if the camera START/STOP switch is at the STOP position.

4.4.7 Pause Mode

1. When shifting from Recording to Pause, 30 frames of the tape are rewound. However, if the camera trigger is employed, the 30 frames are played back in reverse.
2. At the return from REC Pause to Recording, 26 of the frames are played back, then Recording is started with the remaining 4 frames overlapped.
3. Simultaneously pressing the REC and PAUSE/STILL keys yields the operation of above item 1 (after completion of loading).
4. Operations in the A. Dub Pause mode are essentially the same as those of the REC Pause mode. However, pressing the A. DUB and PAUSE/STILL keys produces 30 frames back-space, then the A. Dub Pause mode is entered.

4.4.8 REC Safety

With the REC Safety switch OFF, all Recording mode operations are inhibited. These include Recording, Audio Dub, Insert, Timer Recording, etc.

4.4.9 Speed Selection

1. In the Recording mode, the user selects the tape speed for SP (standard) or EP (3 x).
2. During play-back, the speed set by the SP/EP switch is initially entered, then the control signal from the tape and capstan FG signal are compared for automatically selecting the play-back speed.
3. If the control signal is absent from the tape, the speed selected by the SP/EP switch is first entered, then the SP speed is entered.
4. Recorded speed is also detected in the Search FF and REW modes.
5. In the Reverse Play mode, if the tape recorded speed changes, the tape speed is automatically selected.
6. When the leader section at the beginning of the tape is detected in the Reverse Play and Search Rewind modes, the Play mode is automatically entered.

4.4.10 Insert Mode

1. When the control signal is absent from the tape, the Insert mode is inhibited.
2. If the control signal ceases during Insert, the Play mode is selected.
3. With the MEMORY switch ON during Insert, when the counter indication coincides with that at the time the MEMORY was set, the Play mode is entered.
4. If the SP/EP switch is positioned at the wrong setting during Insert, the Insert operation proceeds automatically at the speed of the underlying recorded segment of tape. However, if the Insert is performed between the points where recording speed was changed, picture loss or disturbance may occur.
5. The above condition (4) also applies to the Audio Dub mode.

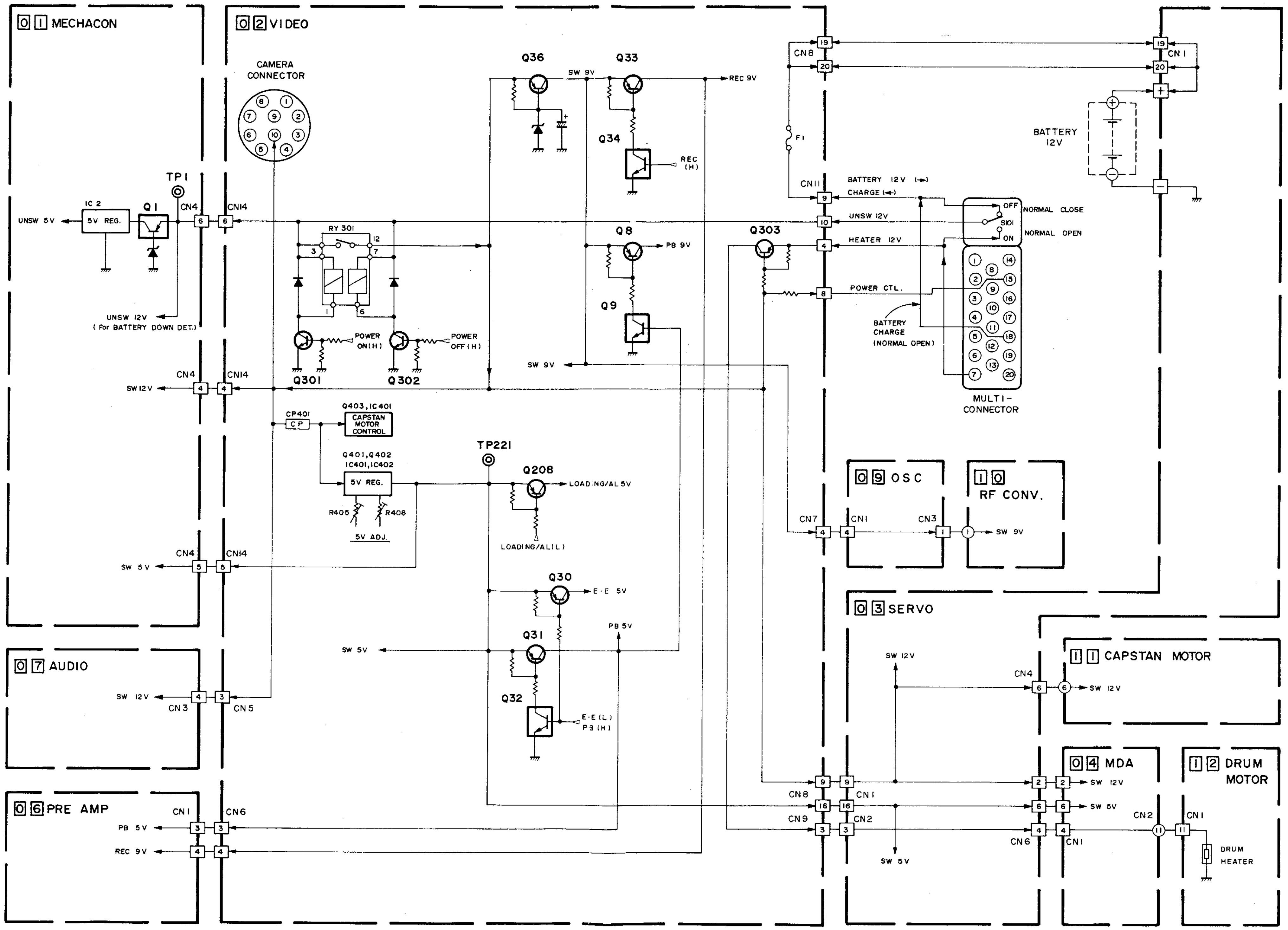
4.4.11 Remote Control (TU-S10 Connected)

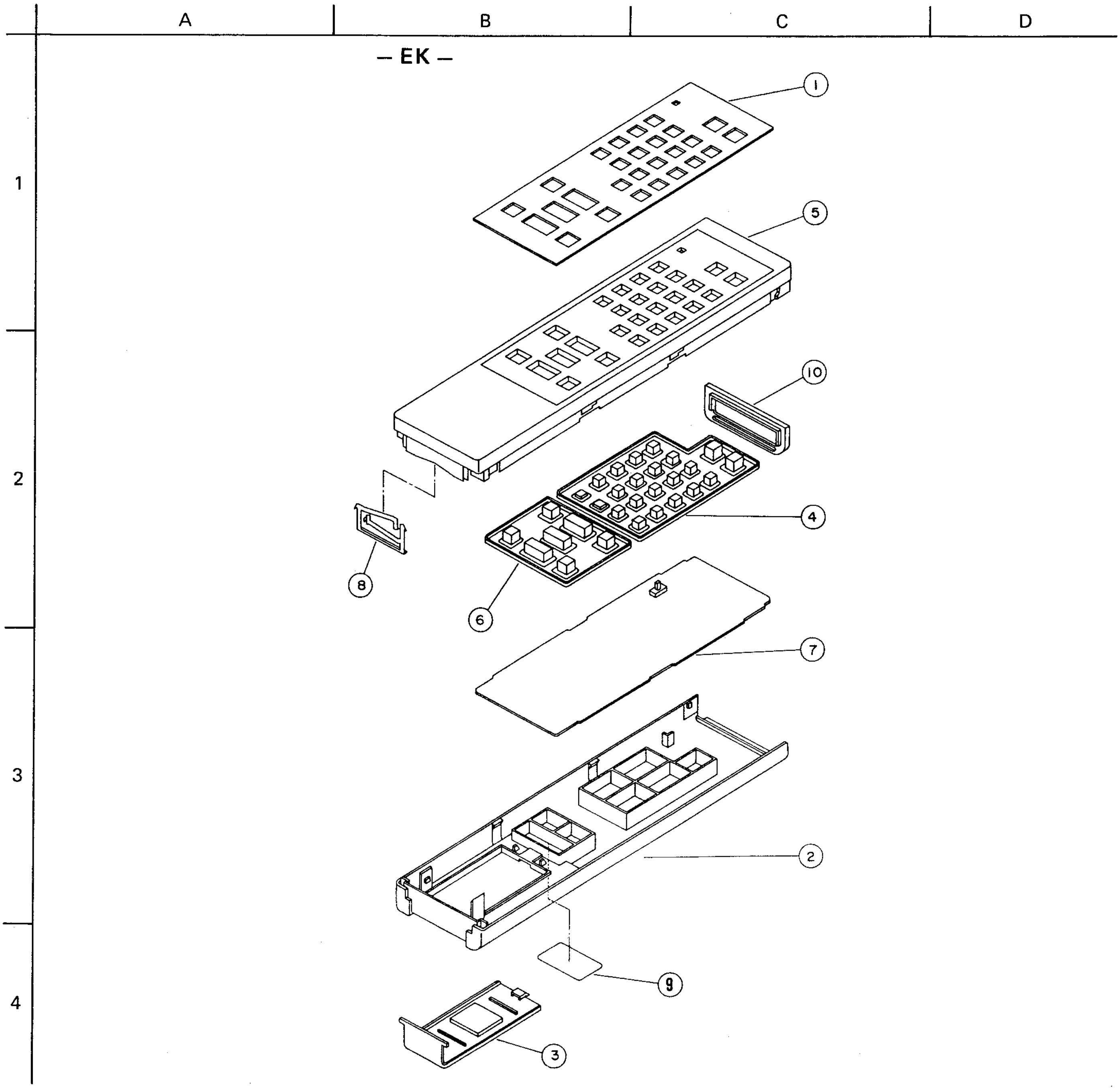
1. Mainframe operating keys have priority over those of the wireless remote control unit.
2. Channel selection from the wireless remote control unit is enabled in all modes except Recording.

KEY OPERATION \ CURRENT MODE	STOP	P B	P B REV.	STILL FORWARD	SEARCH F F	SEARCH REW	F F	REW	REC	REC PAUSE	INSERT	INSERT PAUSE	A REC	A REC PAUSE
STOP	×	○	○	○	○	○	○	○	○	○	○	○	○	○
P B	○	×	○	○	○	○	○	○	×	○	×	○	×	○
P. B REV	○	○	×	○	○	○	○	○	×	×	×	×	×	×
STILL PAUSE	×	○	FRAME ○ ADVANCE	FRAME ○ ADVANCE	○	FRAME ○ ADVANCE	×	×	○	×	○	×	○	×
F F	○	○ SEARCH	○ SEARCH	○ SEARCH	×	○ SEARCH	×	○	×	×	×	×	×	×
REW.	○	○ SEARCH	○ SEARCH	○ SEARCH	○ SEARCH	×	○	×	×	×	×	×	×	×
REC. +P. B	○	○	○	○	○	○	○	○	×	○	×	×	○	○
REC +S P	○	○	○	○	○	○	○	○	○	×	×	×	○	○
INSERT+P B	×	×	×	×	×	×	×	×	×	×	×	○	×	×
INSERT+S P	×	×	×	○	×	×	×	×	×	×	○	×	×	×
A. REC+P. B	○	○	○	○	○	○	○	○	×	×	○	○	×	○
A REC.+S P	○	○	○	○	○	○	○	○	×	×	○	○	○	×
POWER	○	○	○	○	○	○	○	○	○	○	○	○	○	○
EJECT	○	×	×	×	×	×	×	×	×	×	×	×	×	×

× : Inhibited (Mode does not change)
○ : Enabled (Mode changes)

4.5 ELECTRIC POWER PATH BLOCK DIAGRAM

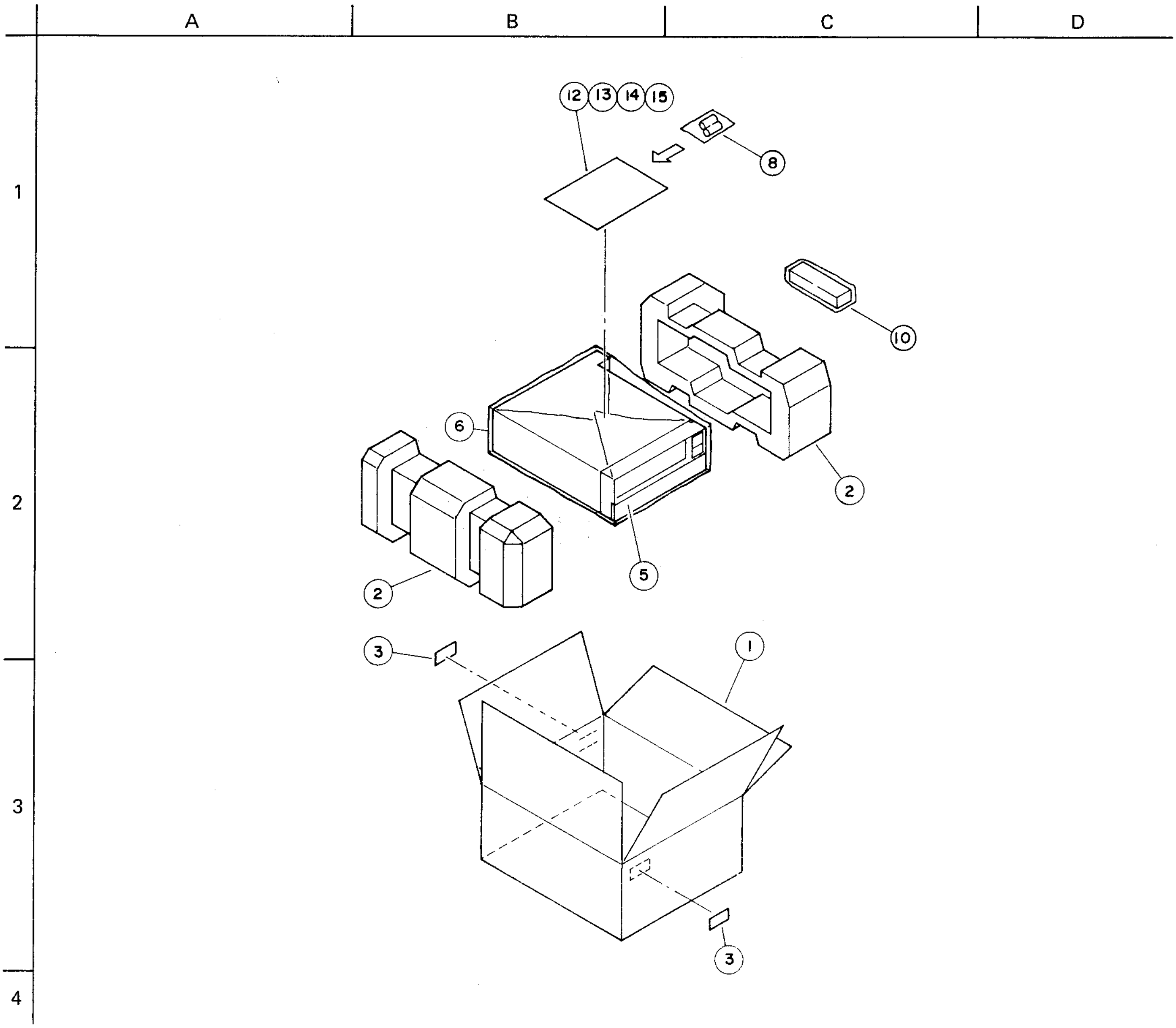

01 MECHACON
02 VIDEO
CAMERA CONNECTOR
Q36
Q33
SW 9V
REC 9V
CN8
19
20
F1
Q34
REC (H)
TP1
IC 2
5V REG.
Q1
UNSW 5V
CN4
CN14
RY 301
POWER ON (H)
POWER OFF (H)
Q301
Q302
UNSW 12V
(For BATTERY DOWN DET.)
Q8
PB 9V
Q9
SW 9V
Q303
CN11
BATTERY 12V (→)
CHARGE (←)
UNSW 12V
HEATER 12V
POWER CTL.
BATTERY CHARGE (NORMAL OPEN)
OFF
S101
ON
NORMAL CLOSE
NORMAL OPEN
MULTI-CONNECTOR
BATTERY 12V
CN1
SW 12V
CP401
CP
Q403, IC401
CAPSTAN MOTOR CONTROL
Q401, Q402
IC401, IC402
5V REG.
R405
R408
5V ADJ.
TP221
Q208
LOADING/AL 5V
LOADING/AL (L)
SW 5V
Q30
E-E 5V
Q31
PB 5V
SW 5V
Q32
E-E (L)
PB (H)
07 AUDIO
SW 12V
CN3
CN5
06 PRE AMP
CN1
CN6
PB 5V
REC 9V
09 OSC
CN7
CN1
CN3
10 RF CONV.
SW 9V
03 SERVO
SW 12V
SW 5V
CN8
CN1
CN9
CN2
11 CAPSTAN MOTOR
CN4
SW 12V
04 MDA
SW 12V
SW 5V
CN6
CN1
CN2
12 DRUM MOTOR
CN1
DRUM HEATER



— **Remote control unit assembly list** —

Symbol No.	Part No.	Part Name	Description	Symbol No. Position	Q'ty
⚠	PU11099N	Remote Control Unit	EG Incl. ① – ⑩		1
⚠	PU11099Q	″	EK Incl. ″		1
1	PU35419-8	Top Panel	EG	1-C	1
	″ -10	″	EK	1-C	1
2	PU35423-2	Bottom Case		3-C	1
3	PU35422-2	Battery Cap		4-B	1
4	PU35420-8	Button (1)	EG	2-C	1
	″ -10	″	EK	2-C	1
5	PU35424-2	Top Case		1-C	1
6	PU35421-4	Button (2)		2-B	1
7	—	Remocon PWB	See Section 5.1.6	3-C	1
8	PU11099-003	Electrode Plate		2-B	1
9	PU35432-4	Remocon Label		4-C	1
10	PU11099-005	Filter Window		2-C	1

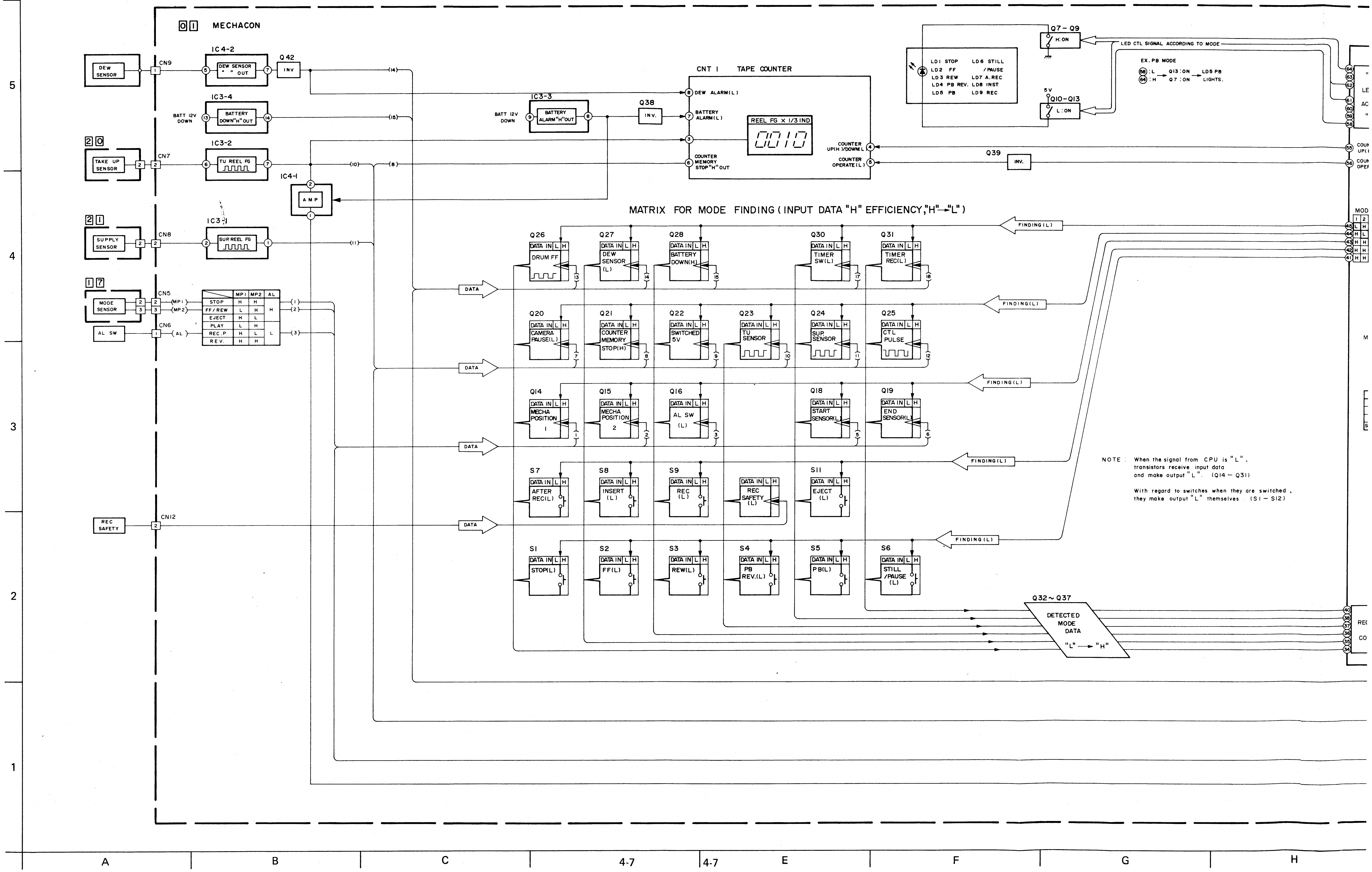
4.2.3 Packing assembly



– Packing assembly list –

Symbol No.	Part No.	Part Name	Description	Symbol No. Position	Q'ty
1	PQ30318-5	Packing Case	EG	2-C	1
	″ -7	″	EK	2-C	1
2	PQ30314A-2	Cushion Ass'y		2-B, C	2
3	PUP40329	Serial No. Sticker		2-B, 3-C	2
4	–	–		–	–
5		TU-S10 Ass'y		2-B	1
6	PQM30021-43	Poly Bag	EG	2-B	1
	PUP30320-22	″	EK	2-B	1
7	–	–		–	–
8	UM-3DJ2P	Battery		1-C	1
9	–	–		–	–
10	–	Remote Control Unit	See Section 4.2.2	1-C	1
11	–	–		–	–
12	PU30425-689	Instruction Book	EG	1-B	1
	″ -691	″	EK	1-B	1
13	BT-20069A	Waranty Card	EG	1-B	1
	BT-20066	Guaranty Card	EK	1-B	1
14	BT-20060	″	EK	1-B	1
15	QPGA025-03505	Poly Bag		1-B	1

4.6 MECHACON BLOCK DIAGRAM

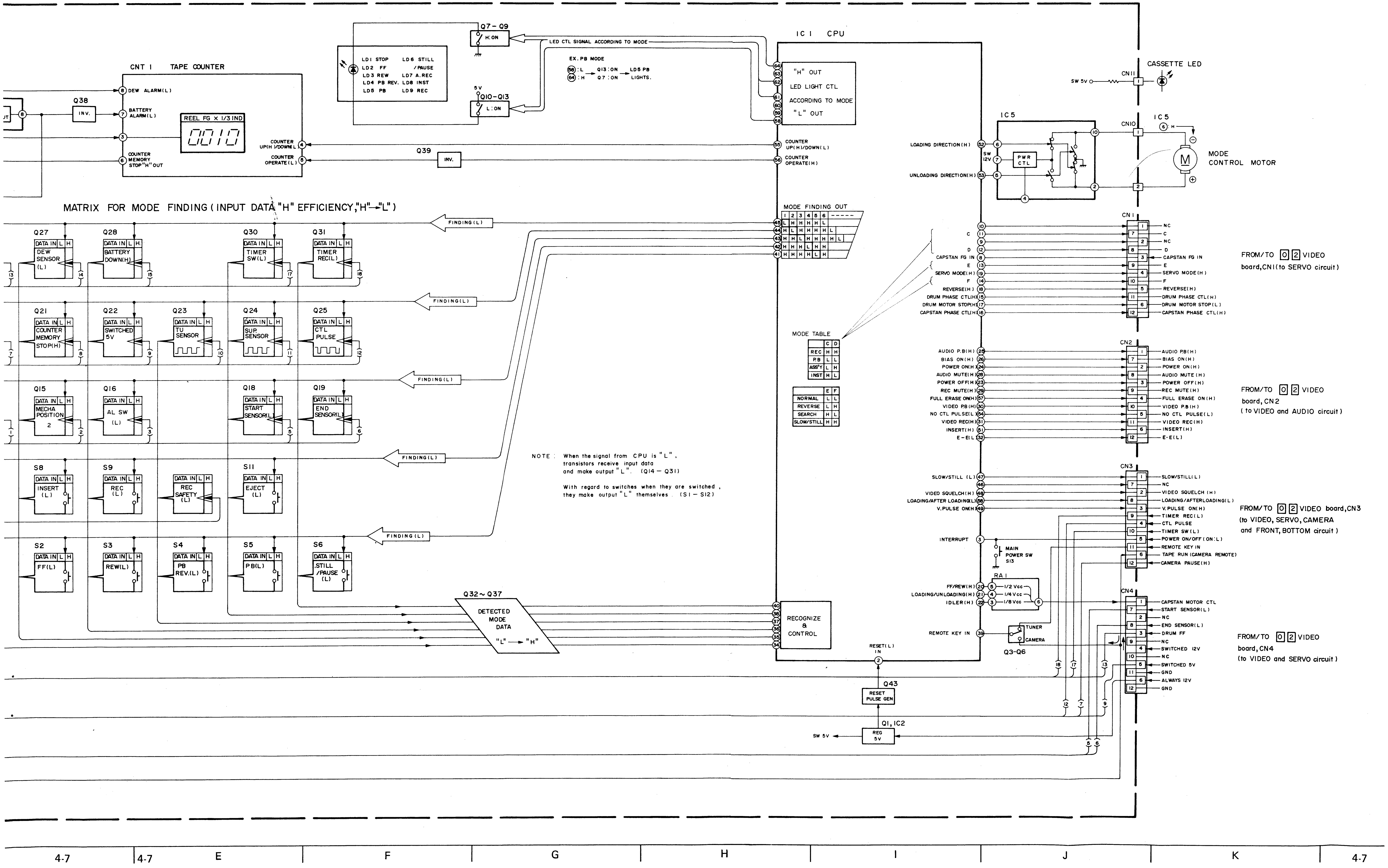


01 MECHACON
DEW SENSOR
CN9
IC4-2
DEW SENSOR " " OUT
Q42
INV
BATT 12V DOWN
IC3-4
BATTERY DOWN"H" OUT
20
TAKE UP SENSOR
CN7
IC3-2
TU REEL FG
IC4-1
AMP
21
SUPPLY SENSOR
CN8
IC3-1
SUP REEL FG
17
MODE SENSOR
CN5
(MP1)
(MP2)
AL SW
CN6
(AL)
REC SAFETY
CN12
IC3-3
BATTERY ALARM"H" OUT
Q38
INV.
CNT 1 TAPE COUNTER
DEW ALARM(L)
BATTERY ALARM(L)
REEL FG × 1/3 IND
0010
COUNTER MEMORY STOP"H" OUT
COUNTER UP(H)/DOWN(L)
COUNTER OPERATE(L)
Q39
INV.
LD1 STOP
LD2 FF
LD3 REW
LD4 PB REV.
LD5 PB
LD6 STILL /PAUSE
LD7 A.REC
LD8 INST
LD9 REC
Q7-Q9
H:ON
5V
Q10-Q13
L:ON
LED CTL SIGNAL ACCORDING TO MODE
EX. PB MODE
58:L → Q13:ON → LD5 PB LIGHTS.
64:H → Q7:ON
MATRIX FOR MODE FINDING (INPUT DATA "H" EFFICIENCY,"H"→"L")
FINDING(L)
DATA
Q26 DRUM FF
Q27 DEW SENSOR (L)
Q28 BATTERY DOWN(H)
Q30 TIMER SW(L)
Q31 TIMER REC(L)
Q20 CAMERA PAUSE(L)
Q21 COUNTER MEMORY STOP(H)
Q22 SWITCHED 5V
Q23 TU SENSOR
Q24 SUP SENSOR
Q25 CTL PULSE
Q14 MECHA POSITION 1
Q15 MECHA POSITION 2
Q16 AL SW (L)
Q18 START SENSOR(L)
Q19 END SENSOR(L)
S7 AFTER REC(L)
S8 INSERT (L)
S9 REC (L)
REC SAFETY (L)
S11 EJECT (L)
S1 STOP(L)
S2 FF(L)
S3 REW(L)
S4 PB REV.(L)
S5 PB(L)
S6 STILL /PAUSE (L)
DATA IN L H
Q32~Q37
DETECTED MODE DATA "L" → "H"
6
5
4
3
2
1
A
B
C
E
F
G
H

	MP1	MP2	AL
STOP	H	H	
FF/REW	L	H	H
EJECT	H	L	
PLAY	L	H	
REC.P	H	L	L
REV.	H	H	

NOTE : When the signal from CPU is "L", transistors receive input data and make output "L". (Q14 – Q31)

With regard to switches when they are switched, they make output "L" themselves. (S1 – S12)


CNT 1 TAPE COUNTER
DEW ALARM(L)
BATTERY ALARM(L)
REEL FG × 1/3 IND
0010
COUNTER MEMORY STOP"H"OUT
COUNTER UP(H)/DOWN(L)
COUNTER OPERATE(L)
Q38
INV.
Q39
INV.
Q7 - Q9
H:ON
Q10-Q13
L:ON
5V
LD1 STOP
LD2 FF
LD3 REW
LD4 PB REV.
LD5 PB
LD6 STILL /PAUSE
LD7 A.REC
LD8 INST
LD9 REC
LED CTL SIGNAL ACCORDING TO MODE
EX. PB MODE
58 :L → Q13:ON → LD5 PB
64 :H → Q7 :ON → LIGHTS.
IC1 CPU
"H" OUT
LED LIGHT CTL
ACCORDING TO MODE
"L" OUT
COUNTER UP(H)/DOWN(L)
COUNTER OPERATE(H)
MODE FINDING OUT
MATRIX FOR MODE FINDING (INPUT DATA "H" EFFICIENCY,"H"→"L")
FINDING(L)
Q27 DATA IN L H DEW SENSOR (L)
Q28 DATA IN L H BATTERY DOWN(H)
Q30 DATA IN L H TIMER SW(L)
Q31 DATA IN L H TIMER REC(L)
Q21 DATA IN L H COUNTER MEMORY STOP(H)
Q22 DATA IN L H SWITCHED 5V
Q23 DATA IN L H TU SENSOR
Q24 DATA IN L H SUP SENSOR
Q25 DATA IN L H CTL PULSE
Q15 DATA IN L H MECHA POSITION 2
Q16 DATA IN L H AL SW (L)
Q18 DATA IN L H START SENSOR(L)
Q19 DATA IN L H END SENSOR(L)
S8 DATA IN L H INSERT (L)
S9 DATA IN L H REC (L)
DATA IN L H REC SAFETY (L)
S11 DATA IN L H EJECT (L)
S2 DATA IN L H FF(L)
S3 DATA IN L H REW(L)
S4 DATA IN L H PB REV.(L)
S5 DATA IN L H PB(L)
S6 DATA IN L H STILL /PAUSE (L)
Q32 ~ Q37
DETECTED MODE DATA "L" → "H"
RECOGNIZE & CONTROL
RESET(L) IN
Q43
RESET PULSE GEN
Q1, IC2
REG 5V
SW 5V
CASSETTE LED
CN11
SW 5V
IC5
PWR CTL
SW 12V
LOADING DIRECTION(H)
UNLOADING DIRECTION(H)
CN10
IC5
H
MODE CONTROL MOTOR
M
CN1
C
D
CAPSTAN FG IN
E
SERVO MODE(H)
F
REVERSE(H)
DRUM PHASE CTL(H)
DRUM MOTOR STOP(H)
CAPSTAN PHASE CTL(H)
NC
C
NC
D
CAPSTAN FG IN
E
SERVO MODE(H)
F
REVERSE(H)
DRUM PHASE CTL(H)
DRUM MOTOR STOP(L)
CAPSTAN PHASE CTL(H)
FROM/TO 02 VIDEO board, CN1 (to SERVO circuit)
CN2
AUDIO P.B(H)
BIAS ON(H)
POWER ON(H)
AUDIO MUTE(H)
POWER OFF(H)
REC MUTE(H)
FULL ERASE ON(H)
VIDEO P.B(H)
NO CTL PULSE(L)
VIDEO REC(H)
INSERT(H)
E-E(L)
FROM/TO 02 VIDEO board, CN2 (to VIDEO and AUDIO circuit)
CN3
SLOW/STILL (L)
VIDEO SQUELCH(H)
LOADING/AFTER LOADING(L)
V.PULSE ON(H)
SLOW/STILL(L)
NC
VIDEO SQUELCH (H)
LOADING/AFTERLOADING(L)
V.PULSE ON(H)
TIMER REC(L)
CTL PULSE
TIMER SW(L)
POWER ON/OFF (ON:L)
REMOTE KEY IN
TAPE RUN (CAMERA REMOTE)
CAMERA PAUSE(H)
FROM/TO 02 VIDEO board, CN3 (to VIDEO, SERVO, CAMERA and FRONT, BOTTOM circuit)
INTERRUPT
MAIN POWER SW S13
RA1
FF/REW(H)
LOADING/UNLOADING(H)
IDLER(H)
1/2 Vcc
1/4 Vcc
1/8 Vcc
REMOTE KEY IN
TUNER
CAMERA
Q3-Q6
CN4
CAPSTAN MOTOR CTL
START SENSOR(L)
NC
END SENSOR(L)
DRUM FF
NC
SWITCHED 12V
NC
SWITCHED 5V
GND
ALWAYS 12V
GND
FROM/TO 02 VIDEO board, CN4 (to VIDEO and SERVO circuit)
4-7
4-7
E
F
G
H
I
J
K
4-7

MODE FINDING OUT

	1	2	3	4	5	6	-----	
45	L	H	H	H	H	L		
44	H	L	H	H	H	H	L	
43	H	H	L	H	H	H	H	L
42	H	H	H	L	H	H		
41	H	H	H	H	L	H		

MODE TABLE

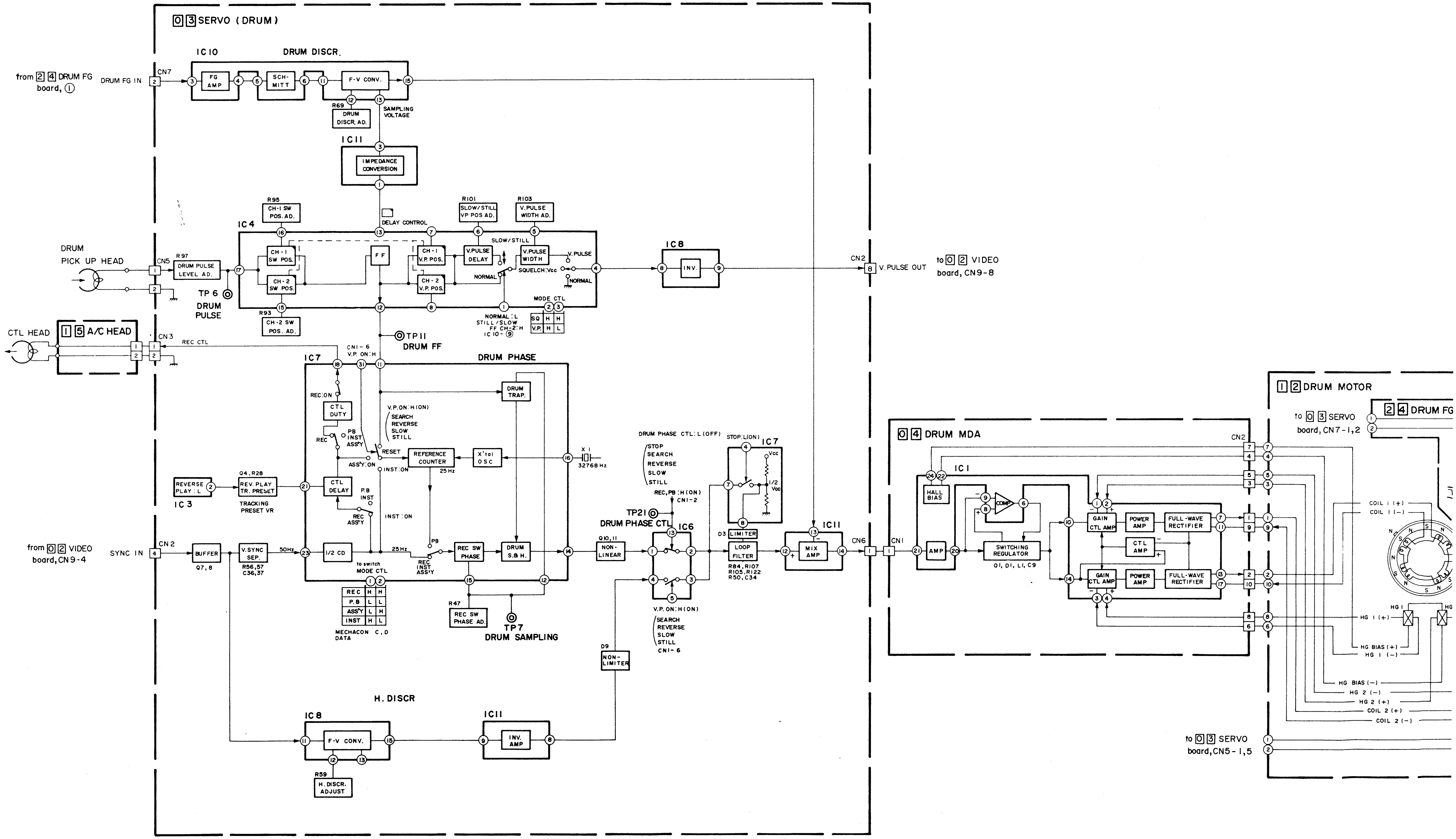
	C	D
REC	H	H
P.B	L	L
ASS'Y	L	H
INST	H	L

	E	F
NORMAL	L	L
REVERSE	L	H
SEARCH	H	L
SLOW/STILL	H	H

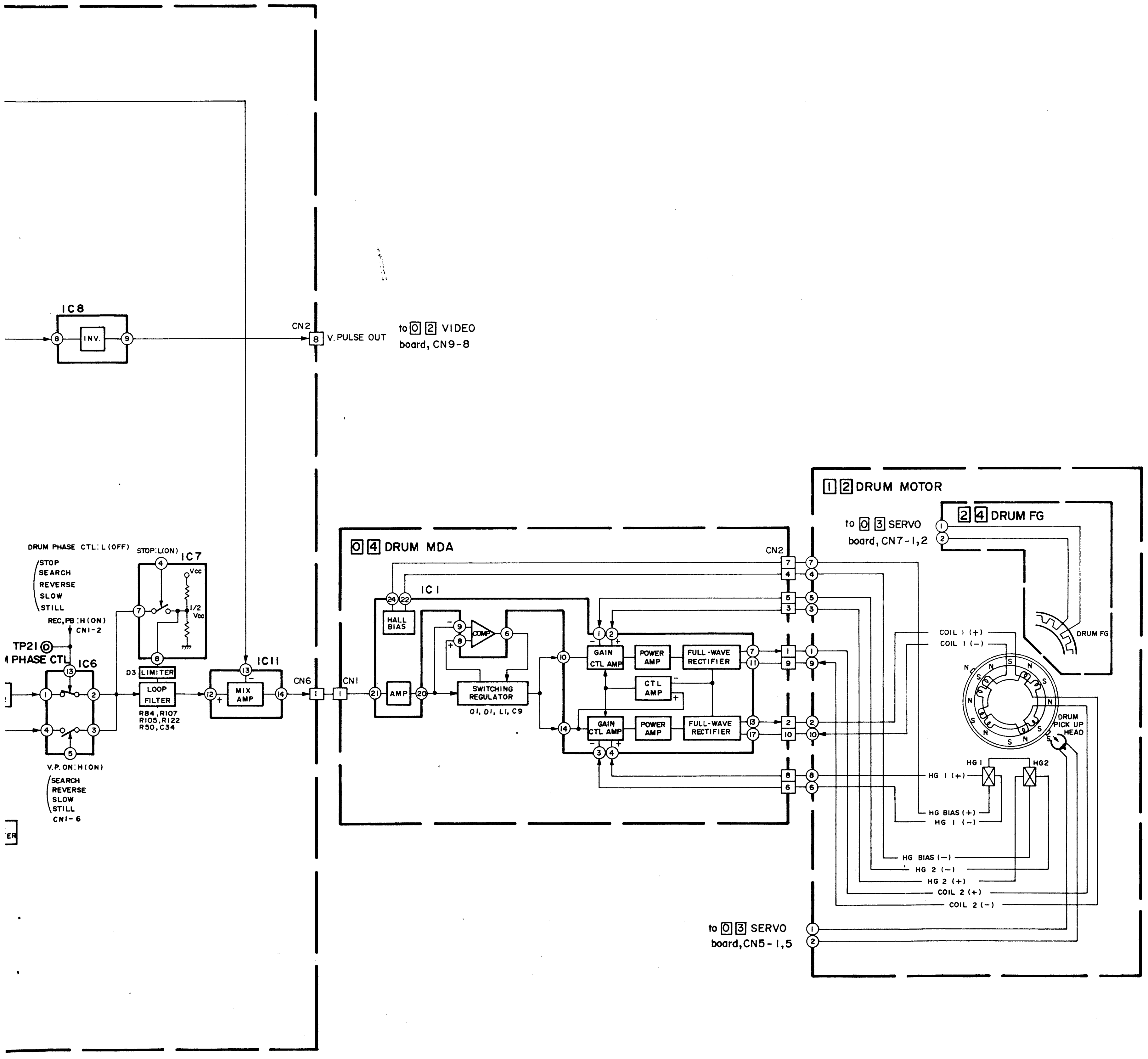
NOTE : When the signal from CPU is "L", transistors receive input data and make output "L". (Q14 – Q31)

With regard to switches when they are switched, they make output "L" themselves. (S1 – S12)

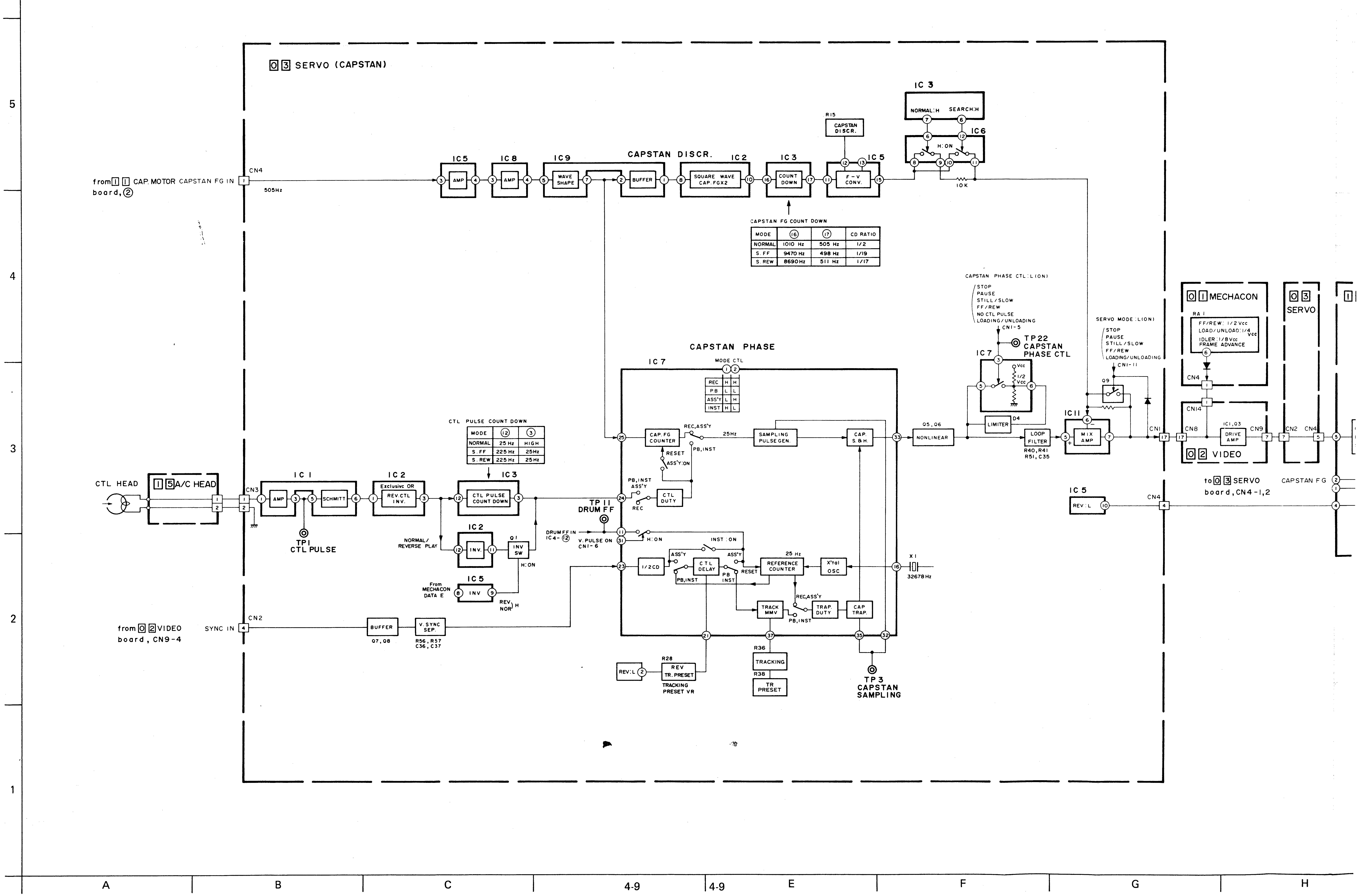
4.7 DRUM SERVO BLOCK DIAGRAM



03 SERVO (DRUM)
from 24 DRUM FG board, ①
DRUM FG IN
CN7
IC10
DRUM DISCR.
FG AMP
SCH-MITT
F-V CONV.
R69 DRUM DISCR. AD.
SAMPLING VOLTAGE
IC11
IMPEDANCE CONVERSION
R95 CH-1 SW POS. AD.
R101 SLOW/STILL VP POS AD.
R103 V.PULSE WIDTH AD.
DELAY CONTROL
IC4
CH-1 SW POS.
CH-2 SW POS.
FF
CH-1 V.P. POS.
CH-2 V.P. POS.
V.PULSE DELAY
SLOW/STILL
V.PULSE WIDTH
V.PULSE
SQUELCH:Vcc
NORMAL
MODE CTL
NORMAL : L
STILL/SLOW FF CH-2 : H
IC10-⑨
SQ H H
V.P. H L
R93 CH-2 SW POS. AD.
DRUM PICK UP HEAD
CN5
R97 DRUM PULSE LEVEL AD.
TP6 DRUM PULSE
IC8
INV.
CN2
V.PULSE OUT
to 02 VIDEO board, CN9-8
CTL HEAD
15 A/C HEAD
CN3
REC CTL
TP11 DRUM FF
CN1-6 V.P. ON : H
IC7
DRUM PHASE
REC:ON
CTL DUTY
DRUM TRAP.
V.P.ON:H(ON)
SEARCH
REVERSE
SLOW
STILL
REC
PB INST ASS'Y
RESET
ASS'Y:ON
INST:ON
REFERENCE COUNTER
X'tal OSC
25Hz
X1
32768Hz
REVERSE PLAY : L
IC3
Q4, R28
REV. PLAY TR. PRESET
TRACKING PRESET VR
CTL DELAY
PB INST
REC ASS'Y
INST : ON
from 02 VIDEO board, CN9-4
SYNC IN
BUFFER
Q7, 8
V.SYNC SEP.
R56,57 C36,37
50Hz
1/2 CD
25Hz
to switch MODE CTL
PB
REC INST ASS'Y
REC SW PHASE
DRUM S.& H.
REC H H
P.B L L
ASS'Y L H
INST H L
MECHACON C, D DATA
R47 REC SW PHASE AD.
TP7 DRUM SAMPLING
DRUM PHASE CTL : L (OFF)
STOP
SEARCH
REVERSE
SLOW
STILL
STOP : L(ON)
IC7
Vcc
1/2 Vcc
REC, PB : H (ON)
CN1-2
TP21 DRUM PHASE CTL
IC6
Q10, 11
NON-LINEAR
D3 LIMITER
LOOP FILTER
R84, R107
R105, R122
R50, C34
IC11
MIX AMP
CN6
V.P. ON : H (ON)
SEARCH
REVERSE
SLOW
STILL
CN1-6
D9
NON-LIMITER
H. DISCR
IC8
F-V CONV.
R59 H. DISCR. ADJUST
IC11
INV. AMP
04 DRUM MDA
CN2
CN1
IC1
HALL BIAS
AMP
COMP
GAIN CTL AMP
POWER AMP
FULL-WAVE RECTIFIER
CTL AMP
SWITCHING REGULATOR
Q1, D1, L1, C9
12 DRUM MOTOR
to 03 SERVO board, CN7-1,2
24 DRUM FG
COIL 1 (+)
COIL 1 (−)
HG 1
HG 1 (+)
HG BIAS (+)
HG 1 (−)
HG BIAS (−)
HG 2 (−)
HG 2 (+)
COIL 2 (+)
COIL 2 (−)
to 03 SERVO board, CN5-1,5


IC8
INV.
CN2
8
V. PULSE OUT
to 0 2 VIDEO
board, CN9-8
DRUM PHASE CTL: L (OFF)
STOP
SEARCH
REVERSE
SLOW
STILL
REC, PB : H (ON)
CN1-2
TP21
PHASE CTL
IC6
V.P. ON: H (ON)
SEARCH
REVERSE
SLOW
STILL
CN1-6
STOP: L(ON)
IC7
Vcc
1/2 Vcc
D3
LIMITER
LOOP FILTER
R84, R107
R105, R122
R50, C34
IC11
MIX AMP
CN6
CN1
0 4 DRUM MDA
IC1
HALL BIAS
AMP
COMP
SWITCHING REGULATOR
Q1, D1, L1, C9
GAIN CTL AMP
POWER AMP
FULL-WAVE RECTIFIER
CTL AMP
1 2 DRUM MOTOR
2 4 DRUM FG
to 0 3 SERVO
board, CN7-1,2
DRUM FG
COIL 1 (+)
COIL 1 (−)
DRUM PICK UP HEAD
HG1
HG2
HG 1 (+)
HG BIAS (+)
HG 1 (−)
HG BIAS (−)
HG 2 (−)
HG 2 (+)
COIL 2 (+)
COIL 2 (−)
to 0 3 SERVO
board, CN5-1,5

4.8 CAPSTAN SERVO BLOCK DIAGRAM


0 3 SERVO (CAPSTAN)
from 1 1 CAP. MOTOR board, ②
CAPSTAN FG IN
CN4
1
505Hz
IC5
AMP
IC8
AMP
IC9
WAVE SHAPE
CAPSTAN DISCR.
BUFFER
IC2
SQUARE WAVE CAP. FG X2
IC3
COUNT DOWN
R15
CAPSTAN DISCR.
IC5
F – V CONV.
IC3
NORMAL:H
SEARCH:H
IC6
H:ON
10K
CAPSTAN PHASE CTL:L(ON)
STOP
PAUSE
STILL/SLOW
FF/REW
NO CTL PULSE
LOADING/UNLOADING
CN1-5
TP22 CAPSTAN PHASE CTL
IC7
Vcc
1/2 Vcc
LIMITER
D4
SERVO MODE:L(ON)
STOP
PAUSE
STILL/SLOW
FF/REW
LOADING/UNLOADING
CN1-11
Q9
IC11
MIX AMP
CN1
17
0 1 MECHACON
RA1
FF/REW: 1/2 Vcc
LOAD/UNLOAD: 1/4 Vcc
IDLER: 1/8 Vcc
FRAME ADVANCE
CN4
CN14
CN8
IC1, Q3
DRIVE AMP
CN9
0 2 VIDEO
0 3 SERVO
CN2
CN4
to 0 3 SERVO board, CN4-1,2
CAPSTAN FG
IC5
REV:L
CN4
4
CAPSTAN PHASE
IC7
MODE CTL
CAP. FG COUNTER
REC,ASS'Y
25Hz
PB,INST
RESET
ASS'Y:ON
SAMPLING PULSE GEN.
CAP. S.&H.
Q5, Q6
NONLINEAR
LOOP FILTER
R40, R41
R51, C35
PB,INST
ASS'Y
REC
CTL DUTY
TP11 DRUM FF
DRUM FF IN IC4-⑫
V. PULSE ON CN1-6
H:ON
INST:ON
ASS'Y
ASS'Y
1/2CD
CTL DELAY
PB,INST
PB INST
RESET
25 Hz
REFERENCE COUNTER
X'tal OSC
X1
32678Hz
REC,ASS'Y
TRACK MMV
PB,INST
TRAP. DUTY
CAP TRAP.
R28
REV:L
REV TR. PRESET
TRACKING PRESET VR
R36
TRACKING
R38
TR PRESET
TP3 CAPSTAN SAMPLING
CTL HEAD
1 5 A/C HEAD
CN3
IC1
AMP
SCHMITT
TP1 CTL PULSE
IC2
Exclusive OR
REV. CTL INV.
IC3
CTL PULSE COUNT DOWN
NORMAL/REVERSE PLAY
IC2
INV.
Q1
INV SW
H:ON
IC5
From MECHACON DATA E
INV
REV NOR H
from 0 2 VIDEO board, CN9-4
SYNC IN
CN2
BUFFER
Q7, Q8
V. SYNC SEP.
R56, R57
C36, C37
6
5
4
3
2
1
A
B
C
E
F
G
H

CAPSTAN FG COUNT DOWN

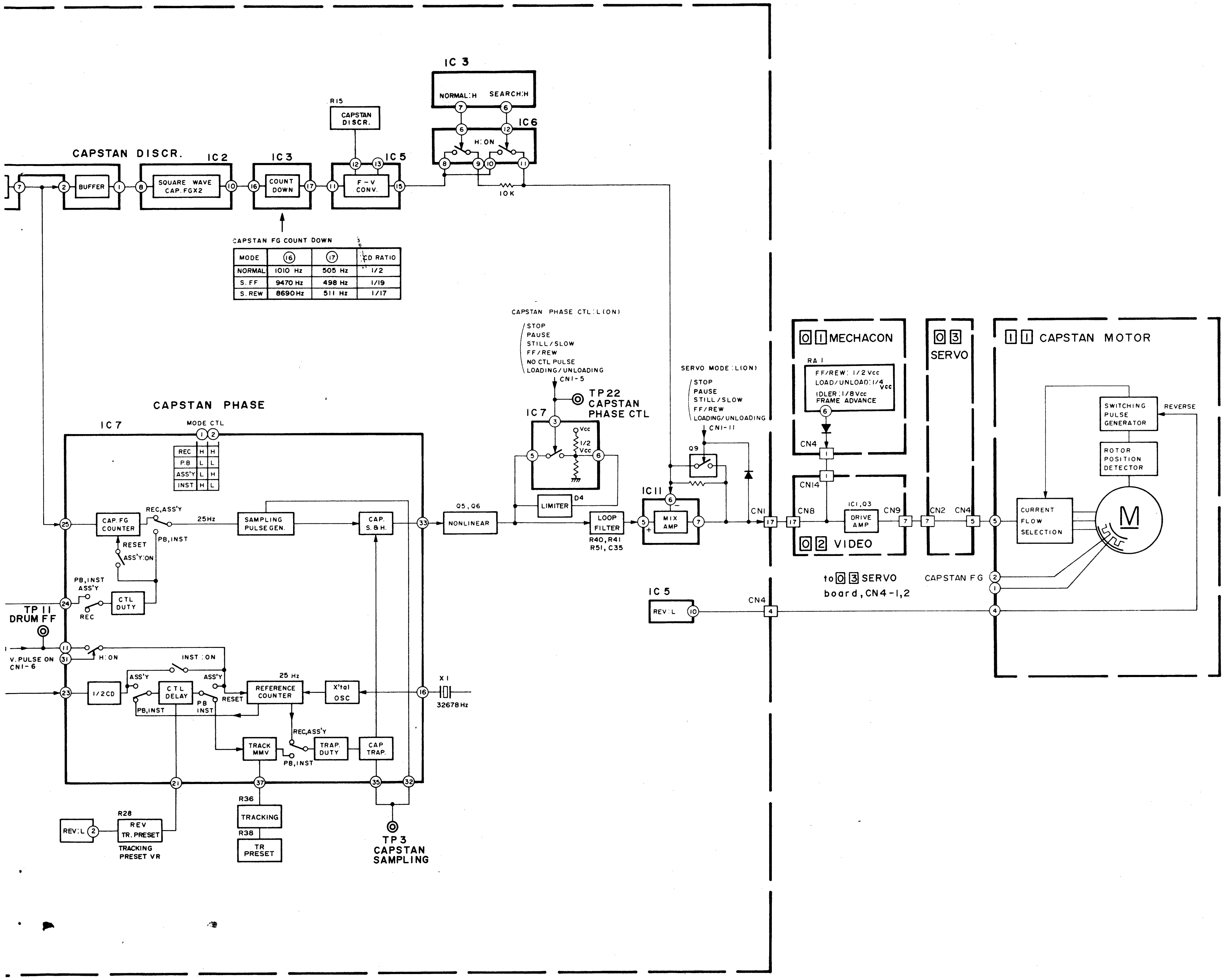
MODE	⑯	⑰	CD RATIO
NORMAL	1010 Hz	505 Hz	1/2
S.FF	9470 Hz	498 Hz	1/19
S.REW	8690 Hz	511 Hz	1/17

CTL PULSE COUNT DOWN

MODE	⑫	③
NORMAL	25 Hz	HIGH
S.FF	225 Hz	25Hz
S.REW	225 Hz	25Hz

MODE CTL

	①	②
REC	H	H
P.B	L	L
ASS'Y	L	H
INST	H	L

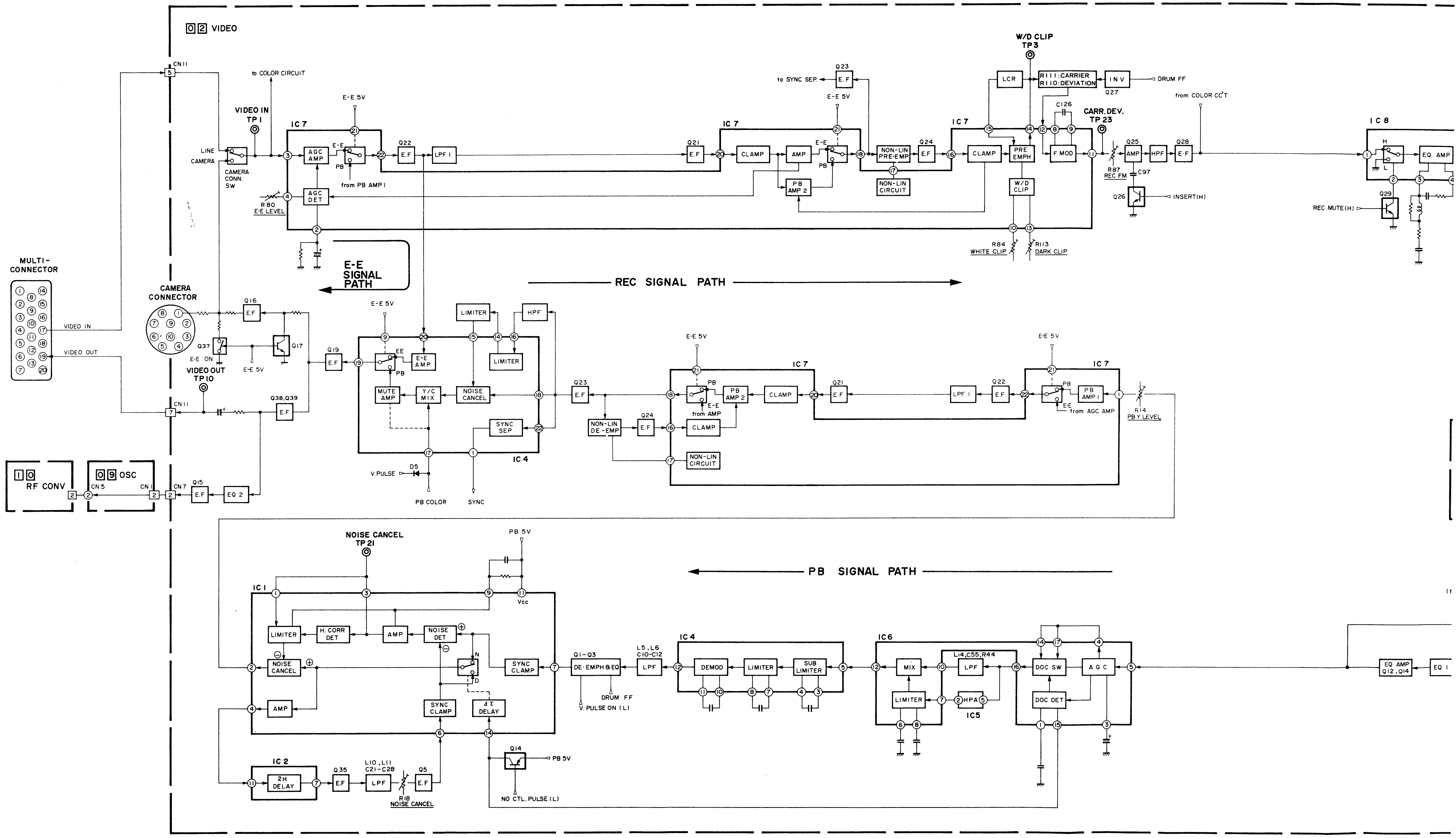

CAPSTAN DISCR.
IC2
IC3
IC5
BUFFER
SQUARE WAVE
CAP. FG×2
COUNT DOWN
R15
CAPSTAN DISCR.
F – V CONV.
IC 3
NORMAL:H
SEARCH:H
IC6
H:ON
10K
CAPSTAN PHASE CTL:L(ON)
STOP
PAUSE
STILL/SLOW
FF/REW
NO CTL PULSE
LOADING/UNLOADING
CN1-5
TP22
CAPSTAN
PHASE CTL
IC7
Vcc
1/2 Vcc
SERVO MODE:L(ON)
STOP
PAUSE
STILL/SLOW
FF/REW
LOADING/UNLOADING
CN1-11
Q9
CAPSTAN PHASE
IC7
MODE CTL
REC H H
PB L L
ASS'Y L H
INST H L
CAP. FG COUNTER
REC, ASS'Y
25Hz
SAMPLING PULSE GEN.
CAP. S.&H.
RESET
ASS'Y:ON
PB, INST
PB, INST
ASS'Y
REC
CTL DUTY
TP11
DRUM FF
V. PULSE ON CN1-6
H:ON
INST:ON
ASS'Y
ASS'Y
1/2CD
CTL DELAY
PB, INST
PB INST
RESET
25 Hz
REFERENCE COUNTER
X'tal OSC
X1
32678Hz
REC, ASS'Y
TRACK MMV
TRAP DUTY
CAP TRAP
PB, INST
R36
TRACKING
R38
TR PRESET
R28
REV:L
REV TR. PRESET
TRACKING PRESET VR
TP3
CAPSTAN
SAMPLING
Q5, Q6
NONLINEAR
LIMITER
D4
LOOP FILTER
R40, R41
R51, C35
IC11
MIX AMP
CN1
01 MECHACON
RA1
FF/REW: 1/2 Vcc
LOAD/UNLOAD: 1/4 Vcc
IDLER: 1/8 Vcc
FRAME ADVANCE
CN4
CN14
CN8
IC1, Q3
DRIVE AMP
CN9
02 VIDEO
03 SERVO
CN2
CN4
11 CAPSTAN MOTOR
SWITCHING PULSE GENERATOR
REVERSE
ROTOR POSITION DETECTOR
CURRENT FLOW SELECTION
M
to 03 SERVO
board, CN4-1,2
CAPSTAN FG
IC5
REV:L
CN4

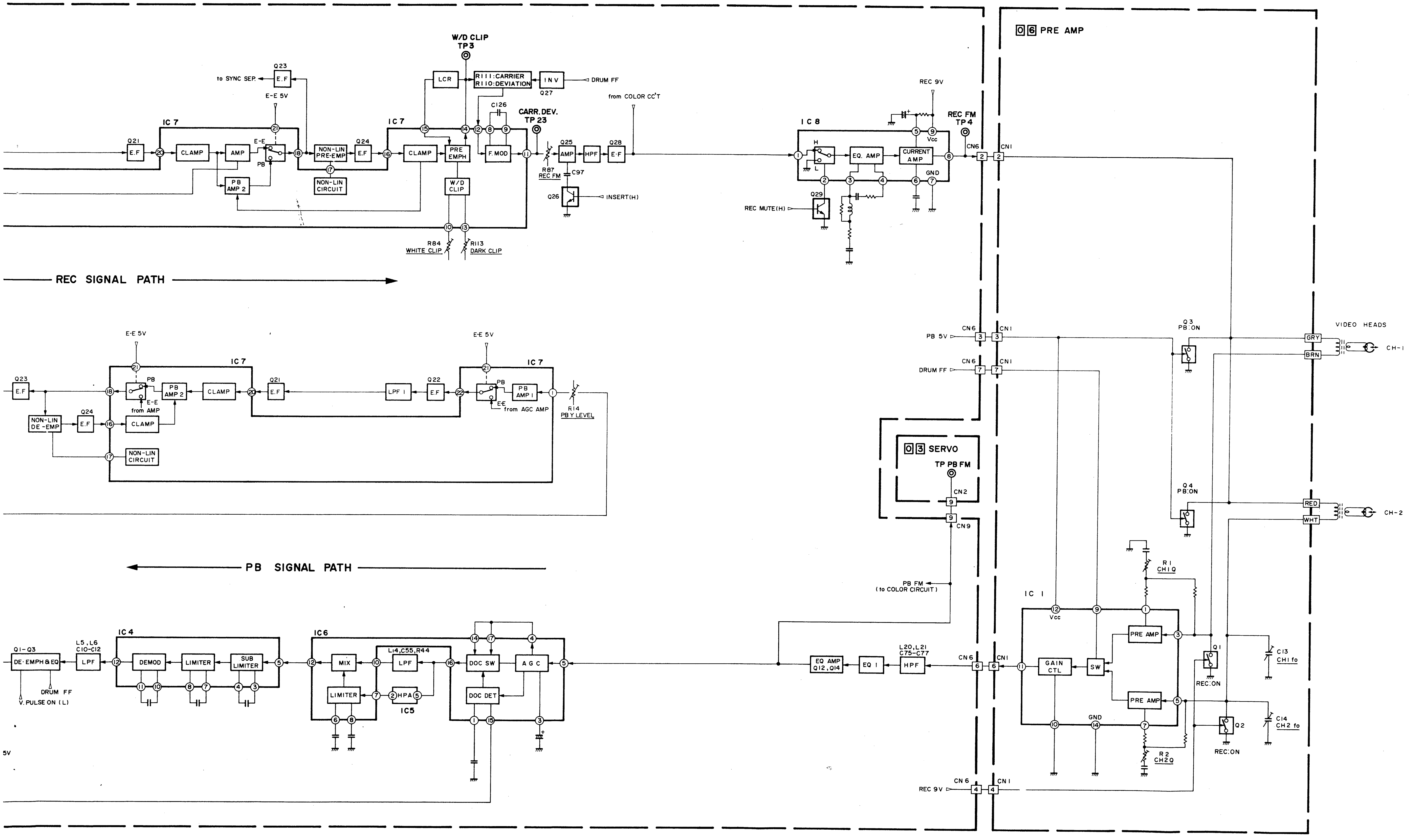
CAPSTAN FG COUNT DOWN

MODE	⑯	⑰	CD RATIO
NORMAL	1010 Hz	505 Hz	1/2
S.FF	9470 Hz	498 Hz	1/19
S.REW	8690 Hz	511 Hz	1/17

4.9 VIDEO BLOCK DIAGRAM

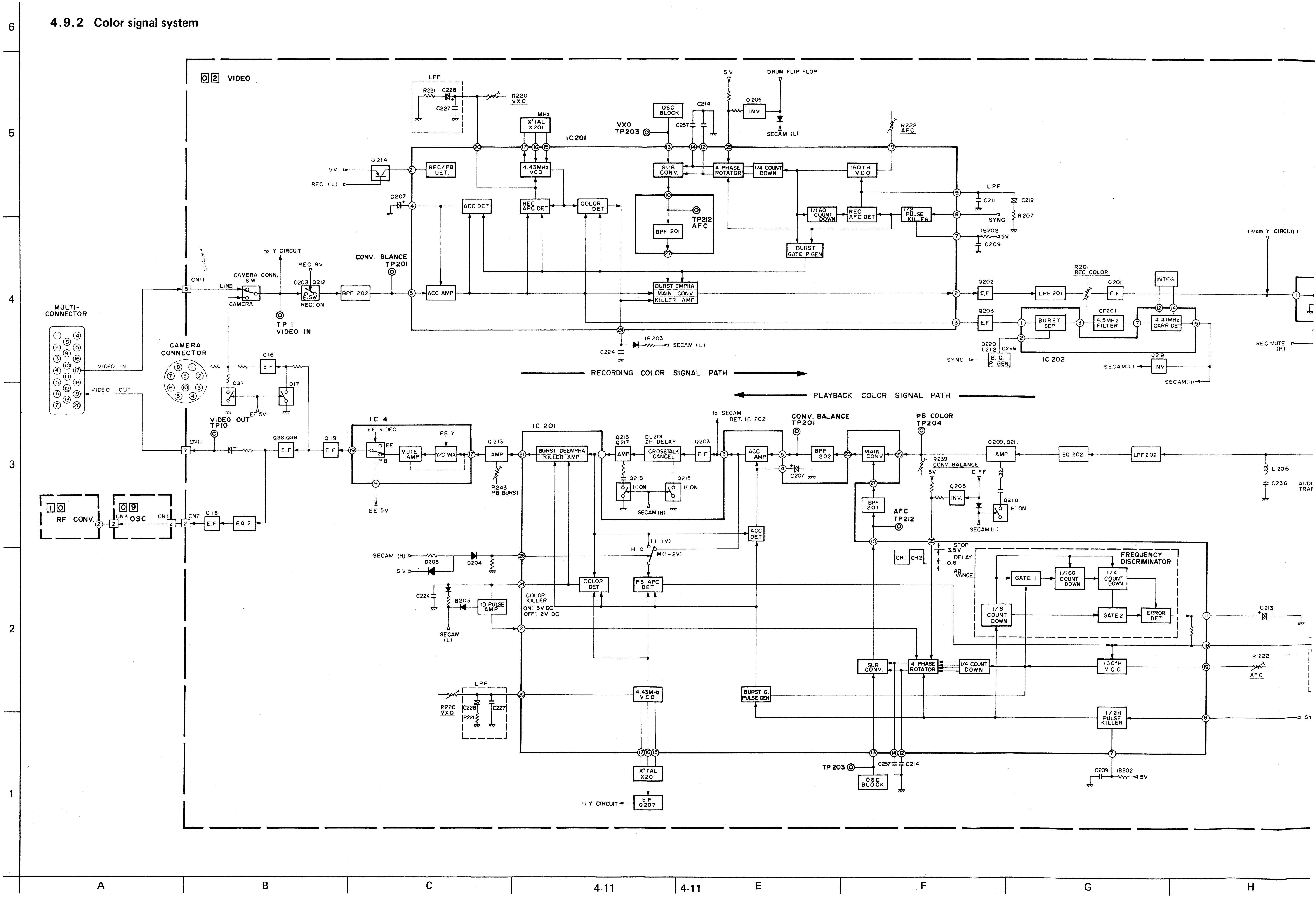
4.9.1 Luminance signal system

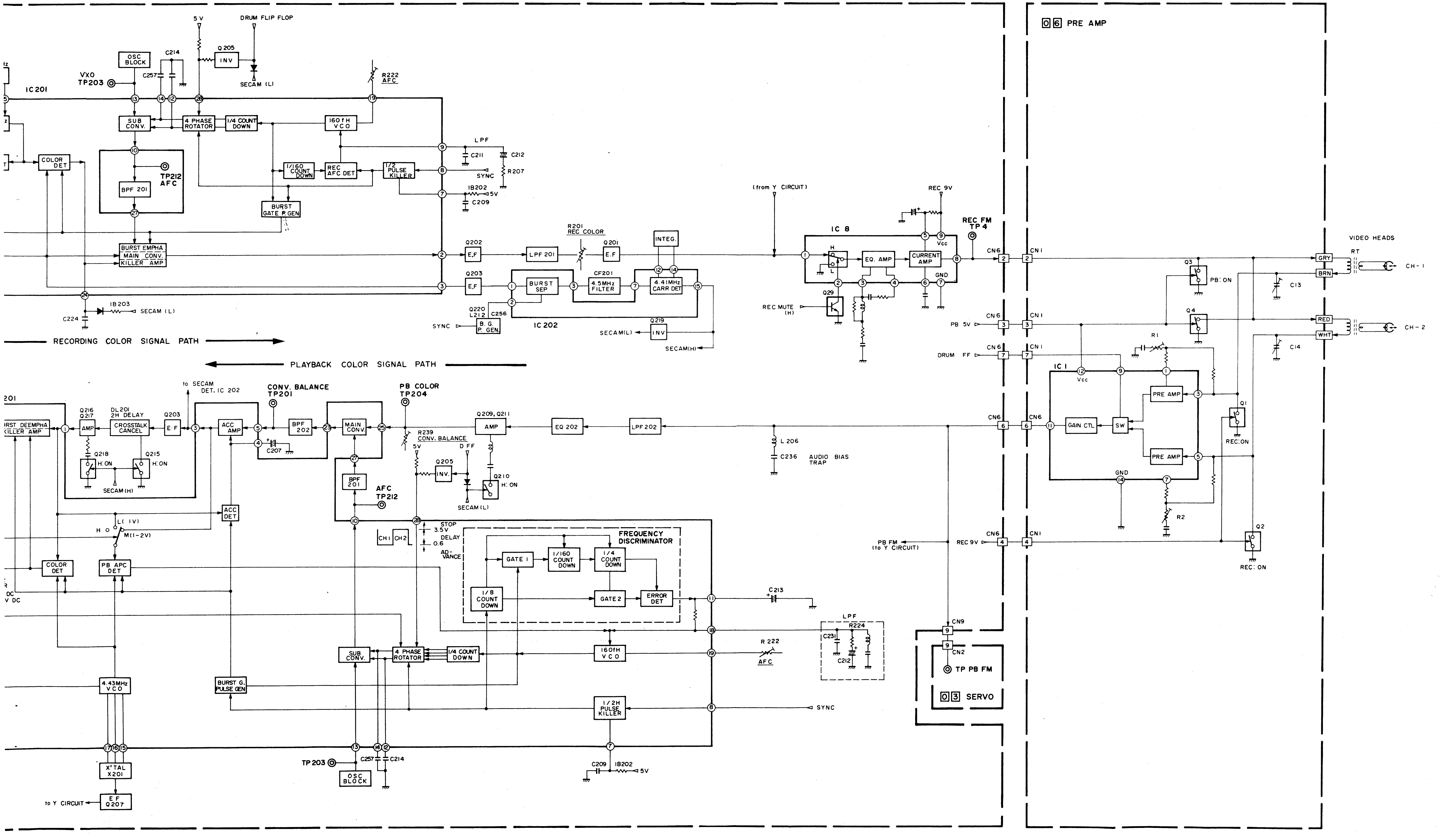

02 VIDEO
CN11
to COLOR CIRCUIT
VIDEO IN
TP1
E-E 5V
IC7
AGC AMP
AGC DET
LINE
CAMERA
CAMERA CONN. SW
from PB AMP 1
R80
E-E LEVEL
Q22
E.F
LPF 1
Q21
CLAMP
AMP
PB AMP 2
NON-LIN PRE-EMP
NON-LIN CIRCUIT
Q23
to SYNC SEP
Q24
PRE EMPH
W/D CLIP
W/D CLIP
TP3
LCR
R111:CARRIER
R110:DEVIATION
INV
Q27
DRUM FF
C126
F.MOD
CARR.DEV.
TP23
R84
WHITE CLIP
R113
DARK CLIP
Q25
HPF
Q28
from COLOR CC'T
R87
REC FM
C97
Q26
INSERT(H)
IC8
EQ. AMP
Q29
REC MUTE(H)
E-E
SIGNAL
PATH
REC SIGNAL PATH
MULTI-
CONNECTOR
VIDEO IN
VIDEO OUT
CAMERA
CONNECTOR
Q16
Q37
Q17
E-E: ON
E-E 5V
VIDEO OUT
TP10
CN11
Q38,Q39
Q19
LIMITER
HPF
E-E AMP
MUTE AMP
Y/C MIX
NOISE CANCEL
SYNC SEP
IC4
D5
V.PULSE
PB COLOR
SYNC
Q23
NON-LIN DE-EMP
Q24
PB AMP 2
from AMP
R14
PB Y LEVEL
PB AMP 1
from AGC AMP
10 RF CONV
09 OSC
CN5
CN1
CN7
Q15
EQ 2
NOISE CANCEL
TP21
PB 5V
PB SIGNAL PATH
IC1
Vcc
H.CORR DET
SYNC CLAMP
4τ DELAY
IC2
2H DELAY
Q35
L10,L11
C21-C28
R18
NOISE CANCEL
Q5
Q14
NO CTL.PULSE (L)
Q1-Q3
DE-EMPH & EQ
V.PULSE ON (L)
DRUM FF
L5,L6
C10-C12
LPF
DEMOD
SUB LIMITER
IC6
MIX
L14,C55,R44
HPA
IC5
DOC SW
AGC
DOC DET
EQ AMP
Q12,Q14
EQ 1
A
B
C
D
E
F
G
1
2
3
4
5
6



06 PRE AMP
03 SERVO
TP PB FM
W/D CLIP
TP3
CARR. DEV.
TP 23
REC FM
TP 4
REC 9V
to SYNC SEP.
E-E 5V
Q23
E.F
IC 7
Q21
CLAMP
AMP
E-E
PB
PB AMP 2
NON-LIN PRE-EMP
NON-LIN CIRCUIT
Q24
PRE EMPH
LCR
R111:CARRIER
R110:DEVIATION
INV
Q27
DRUM FF
C126
F. MOD
W/D CLIP
Q25
HPF
Q28
R87
REC FM
C97
Q26
INSERT(H)
from COLOR CC'T
R84
WHITE CLIP
R113
DARK CLIP
IC 8
H
L
EQ. AMP
CURRENT AMP
Vcc
GND
Q29
REC MUTE(H)
CN6
CN1
REC SIGNAL PATH
PB SIGNAL PATH
PB AMP 1
from AMP
from AGC AMP
LPF 1
Q22
R14
PB Y LEVEL
NON-LIN DE-EMP
PB 5V
Q3
PB:ON
Q4
PB:ON
VIDEO HEADS
GRY
BRN
RED
WHT
CH-1
CH-2
CN2
CN9
PB FM
(to COLOR CIRCUIT)
R1
CH1 Q
R2
CH2 Q
IC 1
PRE AMP
GAIN CTL
SW
Q1
REC:ON
Q2
REC:ON
C13
CH1 fo
C14
CH2 fo
EQ AMP
Q12, Q14
EQ 1
L20, L21
C75-C77
Q1-Q3
DE-EMPH & EQ
L5, L6
C10-C12
LPF
IC4
DEMOD
LIMITER
SUB LIMITER
DRUM FF
V. PULSE ON (L)
IC6
MIX
L14, C55, R44
DOC SW
AGC
LIMITER
HPA
IC5
DOC DET
5V
D
E
F
G
I
J
K
L

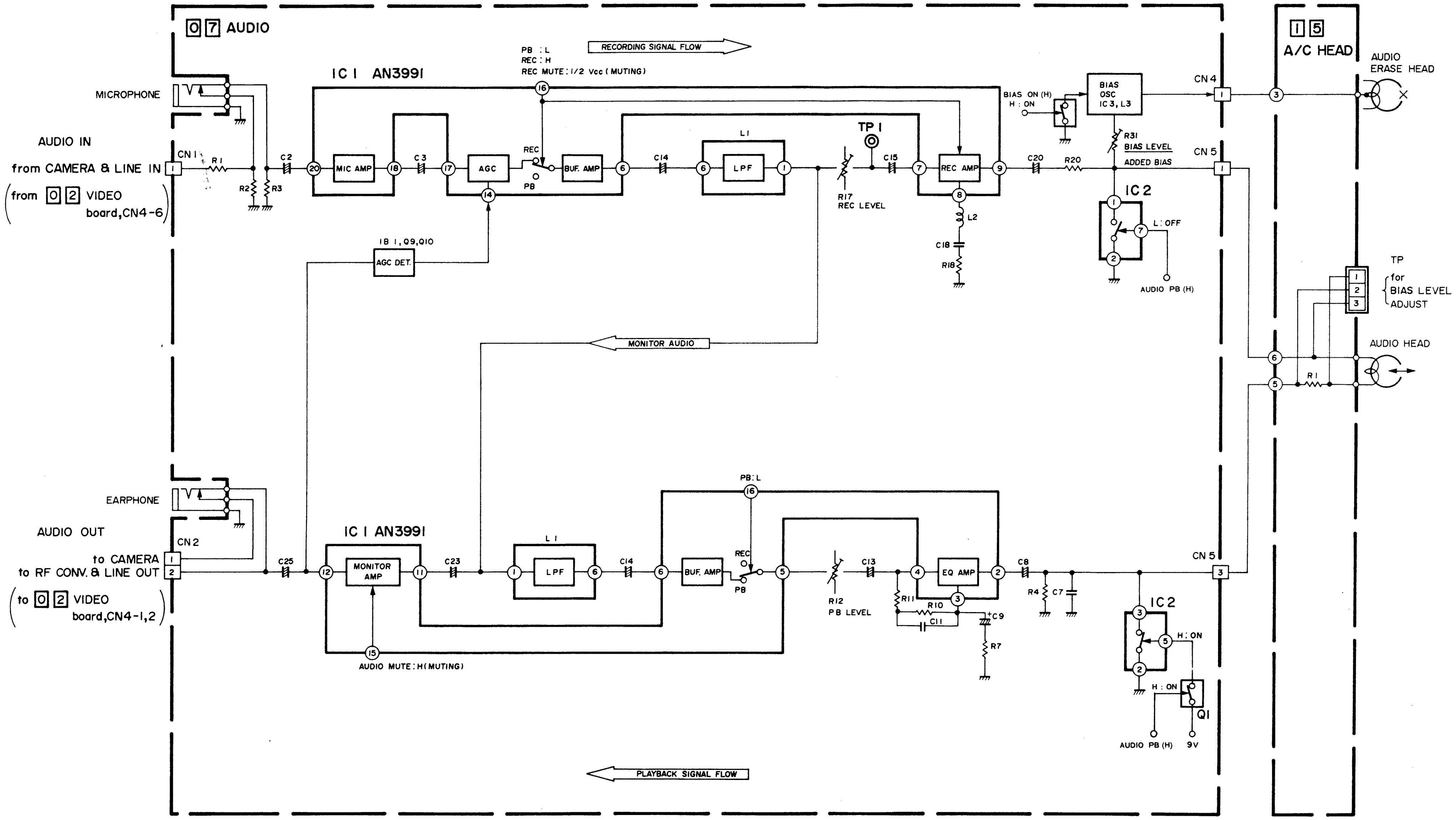
4.9.2 Color signal system


02 VIDEO
MULTI-CONNECTOR
VIDEO IN
VIDEO OUT
CAMERA CONNECTOR
CN11
LINE
CAMERA CONN. SW
CAMERA
to Y CIRCUIT
REC 9V
D203 Q212
E.SW
REC: ON
TP1 VIDEO IN
BPF 202
CONV. BLANCE TP201
Q16 E.F
Q37
Q17
EE 5V
VIDEO OUT TP10
Q38,Q39 E.F
Q19 E.F
Q214
5V
REC (L)
REC/PB DET.
C207
ACC DET
ACC AMP
LPF
R221 C228
C227
R220 VXO
X'TAL X201
MHz
4.43MHz VCO
REC APC DET
COLOR DET
IC 201
OSC BLOCK
C214
C257
VXO TP203
SUB CONV.
TP212 AFC
BPF 201
BURST EMPHA
MAIN CONV.
KILLER AMP
5V
DRUM FLIP FLOP
Q205 INV
SECAM (L)
4 PHASE ROTATOR
1/4 COUNT DOWN
160fH VCO
R222 AFC
1/160 COUNT DOWN
REC AFC DET
1/2 PULSE KILLER
BURST GATE P.GEN
LPF
C211
C212
R207
SYNC
IB202
5V
C209
C224
IB203
SECAM (L)
RECORDING COLOR SIGNAL PATH
PLAYBACK COLOR SIGNAL PATH
Q202 E.F
Q203 E.F
LPF 201
R201 REC COLOR
Q201 E.F
INTEG.
BURST SEP
CF201 4.5MHz FILTER
4.41MHz CARR DET
Q220 L212 C256
B.G. P.GEN
SYNC
IC 202
Q219 INV
SECAM(L)
SECAM(H)
REC MUTE (H)
(from Y CIRCUIT)
IC 4
EE VIDEO
EE
PB
PB Y
MUTE AMP
Y/C MIX
EE 5V
Q213 AMP
R243 PB BURST
IC 201
BURST DEEMPHA KILLER AMP
Q216 Q217 AMP
DL201 2H DELAY
CROSSTALK CANCEL
Q218 H: ON
Q215 H: ON
SECAM (H)
Q203 E.F
to SECAM DET. IC 202
ACC AMP
CONV. BALANCE TP201
BPF 202
C207
MAIN CONV.
PB COLOR TP204
R239 CONV. BALANCE
Q209, Q211 AMP
EQ 202
LPF 202
L 206
C236
AUDI TRA
5V
D FF
Q205 INV.
Q210 H: ON
SECAM (L)
BPF 201
AFC TP212
ACC DET
H O L (1V) M (1-2V)
SECAM (H)
D205
D204
5 V
C224
IB203
ID PULSE AMP
SECAM (L)
COLOR DET
PB APC DET
COLOR KILLER ON: 3V DC OFF: 2V DC
STOP 3.5V
DELAY 0.6
AD-VANCE
CH1 CH2
FREQUENCY DISCRIMINATOR
GATE 1
1/160 COUNT DOWN
1/4 COUNT DOWN
1/8 COUNT DOWN
GATE 2
ERROR DET
C213
R 222 AFC
SUB CONV.
4 PHASE ROTATOR
1/4 COUNT DOWN
160fH VCO
BURST G. PULSE GEN
1/2H PULSE KILLER
SY
LPF
R220 VXO
C228 R221 C227
4.43MHz VCO
X'TAL X201
EF Q207
to Y CIRCUIT
TP203
C257 C214
OSC BLOCK
C209 IB202 5V
10 RF CONV.
09 OSC
CN3 CN1
CN7
Q15 E.F
EQ 2
6
5
4
3
2
1
A
B
C
D
E
F
G
H

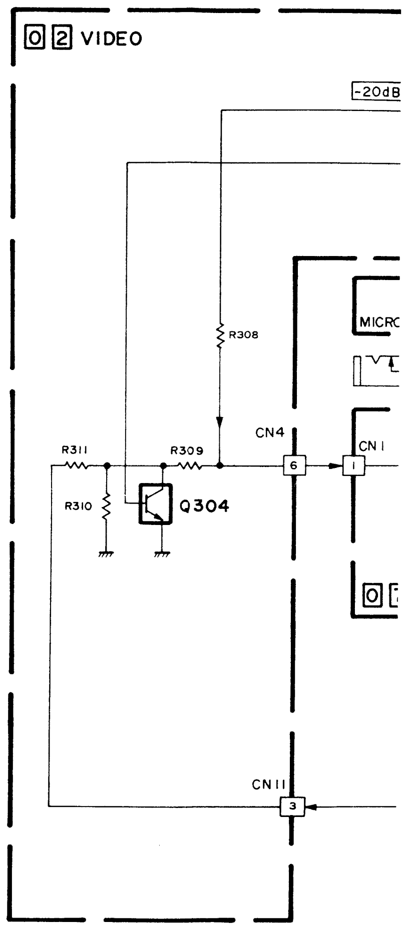

IC 201
VXO TP203
OSC BLOCK
C214
C257
5 V
Q 205
INV
DRUM FLIP FLOP
SECAM (L)
R222 AFC
SUB CONV.
4 PHASE ROTATOR
1/4 COUNT DOWN
160 f H VCO
COLOR DET
TP212 AFC
BPF 201
1/160 COUNT DOWN
REC AFC DET
1/2 PULSE KILLER
LPF
C211
C212
R207
SYNC
IB202
5V
C209
BURST GATE P. GEN
BURST EMPHA MAIN CONV. KILLER AMP
IB203
SECAM (L)
C224
Q202
E.F
Q203
E.F
LPF 201
R201 REC COLOR
Q 201
E.F
INTEG.
BURST SEP
CF201 4.5MHz FILTER
4.41MHz CARR DET
C220 L212
C256
B. G. P. GEN
SYNC
IC 202
Q219
INV
SECAM(L)
SECAM(H)
RECORDING COLOR SIGNAL PATH
PLAYBACK COLOR SIGNAL PATH
(from Y CIRCUIT)
IC 8
REC 9V
H
L
EQ. AMP
CURRENT AMP
Vcc
GND
REC FM TP 4
Q29
REC MUTE (H)
CN6
CN1
PB 5V
DRUM FF
06 PRE AMP
VIDEO HEADS
RT
GRY
BRN
RED
WHT
CH - 1
CH - 2
Q3
PB: ON
Q4
C13
C14
R1
IC 1
Vcc
PRE AMP
GAIN CTL
SW
GND
R2
Q1
REC: ON
Q2
REC: ON
to SECAM DET. IC 202
201
RST DEEMPHA KILLER AMP
Q216 Q217
AMP
DL201 2H DELAY
CROSSTALK CANCEL
Q203
E·F
Q218
H: ON
Q215
H: ON
SECAM (H)
CONV. BALANCE TP201
ACC AMP
C207
BPF 202
MAIN CONV.
PB COLOR TP204
R239 CONV. BALANCE
Q209, Q211
AMP
EQ 202
LPF 202
L 206
C236
AUDIO BIAS TRAP
5V
Q205
INV.
D FF
SECAM (L)
Q210
H: ON
BPF 201
AFC TP212
ACC DET
L(1V)
H
M(1-2V)
COLOR DET
PB APC DET
DC
V DC
CH1 CH2
STOP 3.5V
DELAY 0.6
AD-VANCE
FREQUENCY DISCRIMINATOR
GATE 1
1/160 COUNT DOWN
1/4 COUNT DOWN
1/8 COUNT DOWN
GATE 2
ERROR DET
C213
LPF
C231
R224
C212
R 222
AFC
PB FM (to Y CIRCUIT)
REC 9V
CN9
CN2
TP PB FM
03 SERVO
SUB CONV.
4 PHASE ROTATOR
1/4 COUNT DOWN
160fH VCO
4.43MHz VCO
BURST G. PULSE GEN
1/2H PULSE KILLER
SYNC
X'TAL X201
E F Q207
to Y CIRCUIT
TP 203
C257
C214
OSC BLOCK
C209
IB202
5V

4.10 AUDIO BLOCK DIAGRAM

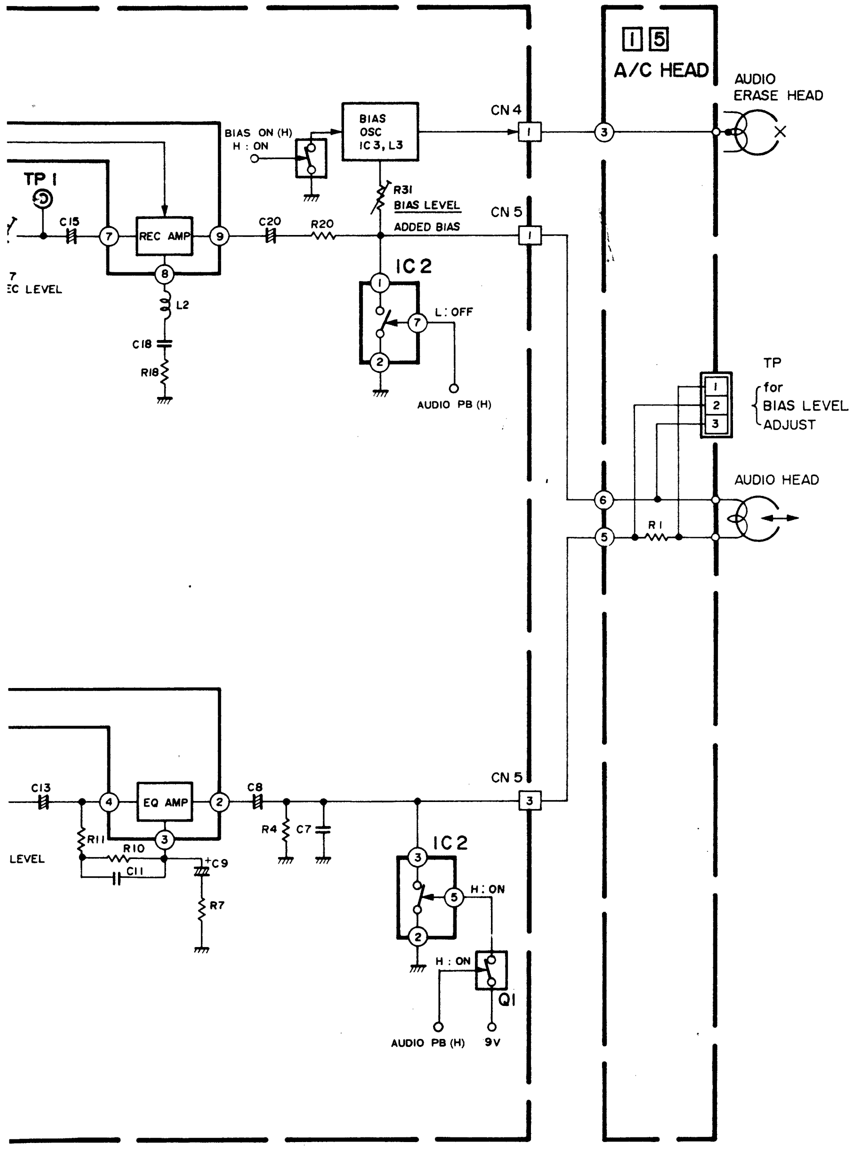
4.10.1 Audio block diagram


07 AUDIO
RECORDING SIGNAL FLOW
PB : L
REC : H
REC MUTE : 1/2 Vcc (MUTING)
IC 1 AN3991
MICROPHONE
AUDIO IN
from CAMERA & LINE IN
(from 02 VIDEO board, CN4-6)
CN1
R1
R2
R3
C2
MIC AMP
C3
AGC
REC
PB
BUF. AMP
C14
L1
LPF
TP1
R17
REC LEVEL
C15
REC AMP
L2
C18
R18
IB1, Q9, Q10
AGC DET.
BIAS ON (H)
H : ON
BIAS OSC
IC3, L3
R31
BIAS LEVEL
ADDED BIAS
C20
R20
IC2
L : OFF
AUDIO PB (H)
CN4
CN5
MONITOR AUDIO
EARPHONE
AUDIO OUT
CN2
to CAMERA
to RF CONV. & LINE OUT
(to 02 VIDEO board, CN4-1,2)
C25
MONITOR AMP
C23
PB : L
BUF. AMP
R12
PB LEVEL
C13
R11
R10
C11
EQ AMP
C9
R7
C8
R4
C7
H : ON
Q1
9V
AUDIO MUTE : H (MUTING)
PLAYBACK SIGNAL FLOW
15
A/C HEAD
AUDIO ERASE HEAD
TP
for BIAS LEVEL ADJUST
AUDIO HEAD

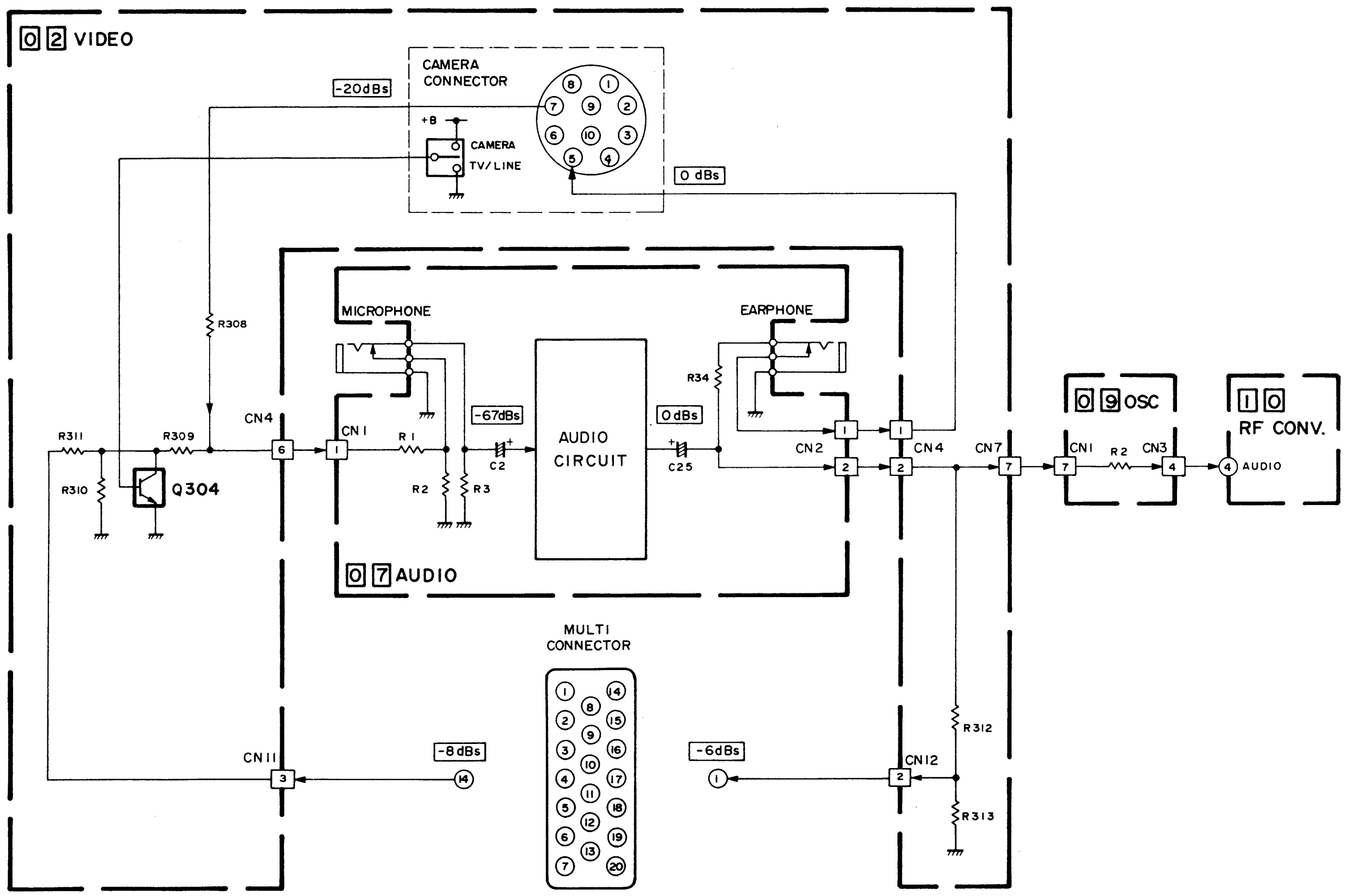
4.10.2 Audio signal path


02 VIDEO
-20dB
R308
MICRO
R311
R310
R309
Q304
CN4
CN1
CN11

4.10.2 Audio signal path

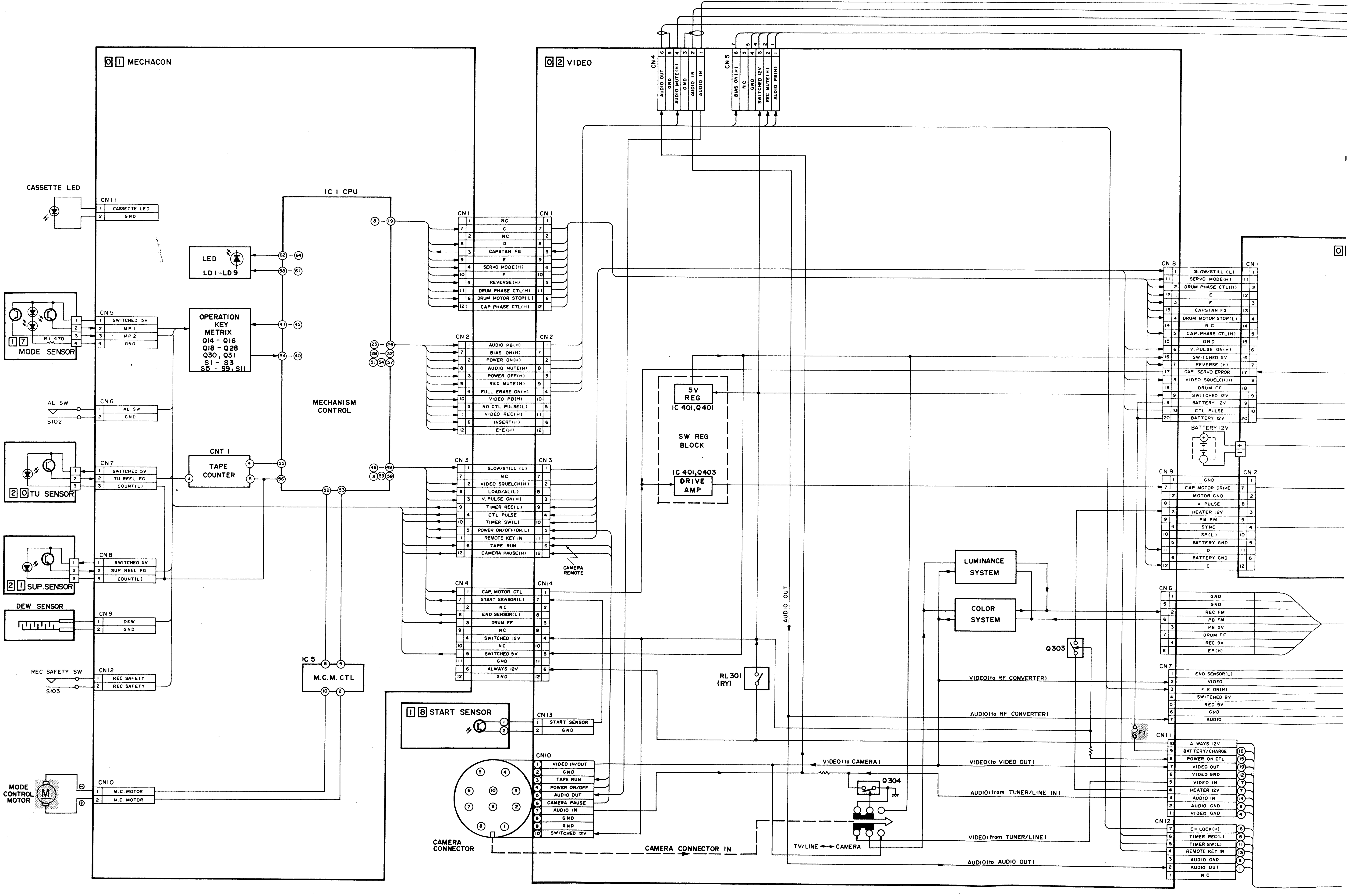


15 A/C HEAD
AUDIO ERASE HEAD
AUDIO HEAD
TP
for
BIAS LEVEL
ADJUST
BIAS ON (H)
H : ON
BIAS OSC IC3, L3
CN4
CN5
R31
BIAS LEVEL
ADDED BIAS
TP1
C15
REC AMP
C20
R20
IC2
L : OFF
AUDIO PB (H)
L2
C18
R18
REC LEVEL
R1
C13
EQ AMP
C8
R4
C7
R11
R10
C11
C9
R7
LEVEL
IC2
H : ON
Q1
AUDIO PB (H)
9V

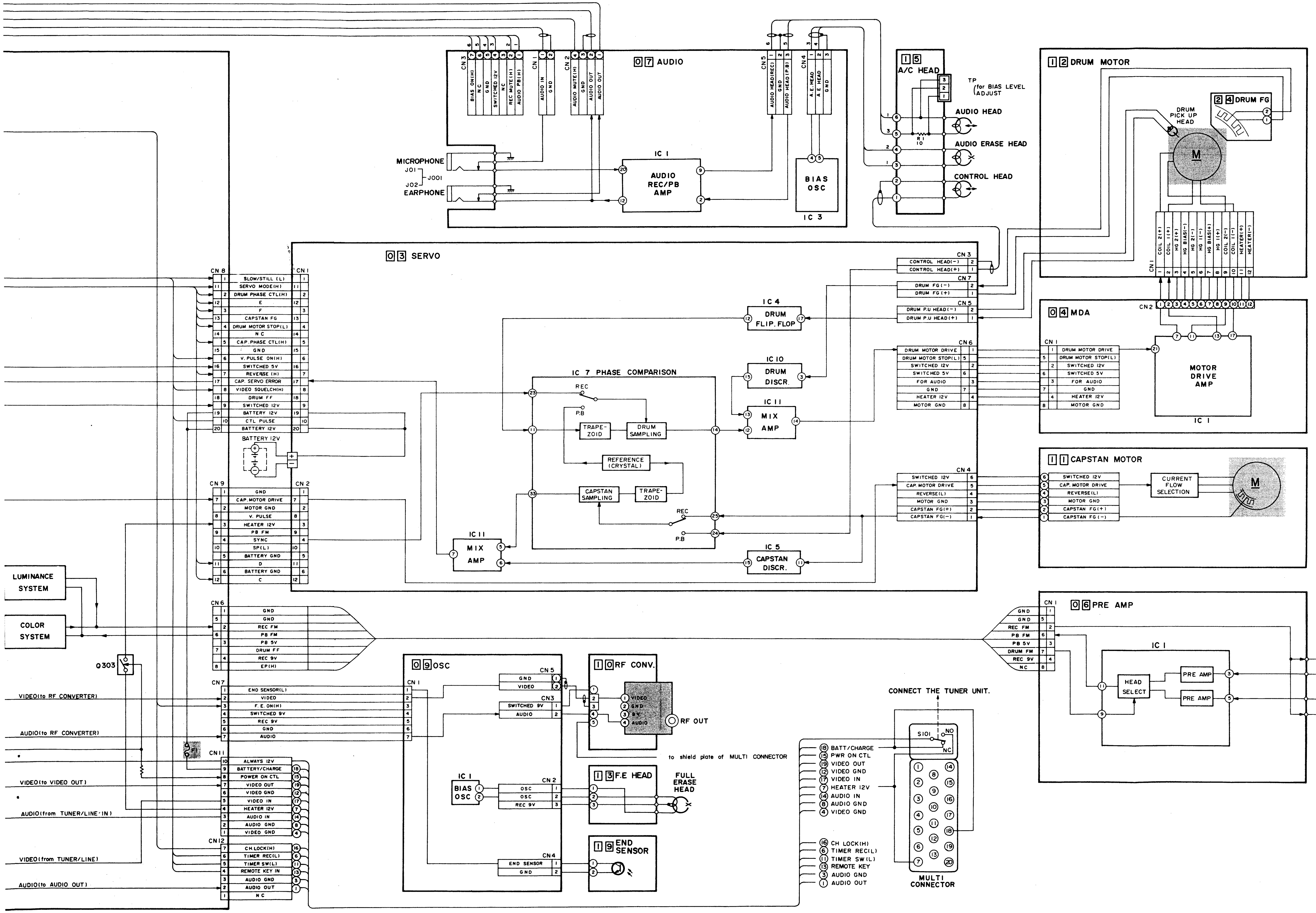


02 VIDEO
CAMERA CONNECTOR
-20dBs
+B
CAMERA
TV/LINE
0 dBs
R308
MICROPHONE
EARPHONE
R34
-67dBs
AUDIO CIRCUIT
0dBs
R311
R309
R310
Q304
CN4
CN1
R1
C2
R2
R3
C25
CN2
CN4
CN7
07 AUDIO
09 OSC
CN1
R2
CN3
10 RF CONV.
AUDIO
MULTI CONNECTOR
CN11
-8dBs
-6dBs
CN12
R312
R313

4.11 OVERALL WIRING



0 1 MECHACON
0 2 VIDEO
CASSETTE LED
CN11
1 CASSETTE LED
2 GND
CN5
1 SWITCHED 5V
2 MP 1
3 MP 2
4 GND
R1 470
1 7 MODE SENSOR
AL SW
S102
CN6
1 AL SW
2 GND
CN7
1 SWITCHED 5V
2 TU REEL FG
3 COUNT(L)
2 0 TU SENSOR
CN8
1 SWITCHED 5V
2 SUP. REEL FG
3 COUNT(L)
2 1 SUP. SENSOR
DEW SENSOR
CN9
1 DEW
2 GND
REC SAFETY SW
S103
CN12
1 REC SAFETY
2 REC SAFETY
MODE CONTROL MOTOR
M
CN10
1 M.C.MOTOR
2 M.C.MOTOR
LED
LD1-LD9
OPERATION KEY METRIX
Q14 - Q16
Q18 - Q28
Q30, Q31
S1 - S3
S5 - S9, S11
CNT 1
TAPE COUNTER
IC 1 CPU
MECHANISM CONTROL
IC 5
M.C.M. CTL
CN1
1 NC
7 C
2 NC
8 D
3 CAPSTAN FG
9 E
4 SERVO MODE(H)
10 F
5 REVERSE(H)
11 DRUM PHASE CTL(H)
6 DRUM MOTOR STOP(L)
12 CAP. PHASE CTL(H)
CN2
1 AUDIO PB(H)
7 BIAS ON(H)
2 POWER ON(H)
8 AUDIO MUTE(H)
3 POWER OFF(H)
9 REC MUTE(H)
4 FULL ERASE ON(H)
10 VIDEO PB(H)
5 NO CTL PULSE(L)
11 VIDEO REC(H)
6 INSERT(H)
12 E-E(H)
CN3
1 SLOW/STILL (L)
7 NC
2 VIDEO SQUELCH(H)
8 LOAD/AL(L)
3 V. PULSE ON(H)
9 TIMER REC(L)
4 CTL PULSE
10 TIMER SW(L)
5 POWER ON/OFF(ON:L)
11 REMOTE KEY IN
6 TAPE RUN
12 CAMERA PAUSE(H)
CN4
CN14
1 CAP. MOTOR CTL
7 START SENSOR(L)
2 NC
8 END SENSOR(L)
3 DRUM FF
9 NC
4 SWITCHED 12V
10 NC
5 SWITCHED 5V
11 GND
6 ALWAYS 12V
12 GND
CAMERA REMOTE
1 8 START SENSOR
CN13
1 START SENSOR
2 GND
CN10
1 VIDEO IN/OUT
2 GND
3 TAPE RUN
4 POWER ON/OFF
5 AUDIO OUT
6 CAMERA PAUSE
7 AUDIO IN
8 GND
9 GND
10 SWITCHED 12V
CAMERA CONNECTOR
CAMERA CONNECTOR IN
CN4
6 AUDIO OUT
5 GND
4 AUDIO MUTE(H)
3 GND
2 AUDIO IN
1 AUDIO IN
CN5
7 BIAS ON(H)
6 NC
5 GND
4 SWITCHED 12V
3 REC MUTE(H)
2 AUDIO PB(H)
5V REG
IC 401, Q401
SW REG BLOCK
IC 401, Q403
DRIVE AMP
AUDIO OUT
RL301 (RY)
LUMINANCE SYSTEM
COLOR SYSTEM
Q303
Q304
VIDEO(to CAMERA)
TV/LINE ◄► CAMERA
VIDEO(to RF CONVERTER)
AUDIO(to RF CONVERTER)
VIDEO(to VIDEO OUT)
AUDIO(from TUNER/LINE IN)
VIDEO(from TUNER/LINE)
AUDIO(to AUDIO OUT)
F1
CN8
CN1
1 SLOW/STILL (L)
11 SERVO MODE(H)
2 DRUM PHASE CTL(H)
12 E
3 F
13 CAPSTAN FG
4 DRUM MOTOR STOP(L)
14 NC
5 CAP. PHASE CTL(H)
15 GND
6 V. PULSE ON(H)
16 SWITCHED 5V
7 REVERSE (H)
17 CAP. SERVO ERROR
8 VIDEO SQUELCH(H)
18 DRUM FF
9 SWITCHED 12V
19 BATTERY 12V
10 CTL PULSE
20 BATTERY 12V
BATTERY 12V
CN9
CN2
1 GND
7 CAP. MOTOR DRIVE
2 MOTOR GND
8 V. PULSE
3 HEATER 12V
9 PB FM
4 SYNC
10 SP(L)
5 BATTERY GND
11 D
6 BATTERY GND
12 C
CN6
1 GND
5 GND
2 REC FM
6 PB FM
3 PB 5V
7 DRUM FF
4 REC 9V
8 EP(H)
CN7
1 END SENSOR(L)
2 VIDEO
3 F.E ON(H)
4 SWITCHED 9V
5 REC 9V
6 GND
7 AUDIO
CN11
10 ALWAYS 12V
9 BATTERY/CHARGE
8 POWER ON CTL
7 VIDEO OUT
6 VIDEO GND
5 VIDEO IN
4 HEATER 12V
3 AUDIO IN
2 AUDIO GND
1 VIDEO GND
CN12
7 CH.LOCK(H)
6 TIMER REC(L)
5 TIMER SW(L)
4 REMOTE KEY IN
3 AUDIO GND
2 AUDIO OUT
1 NC
0

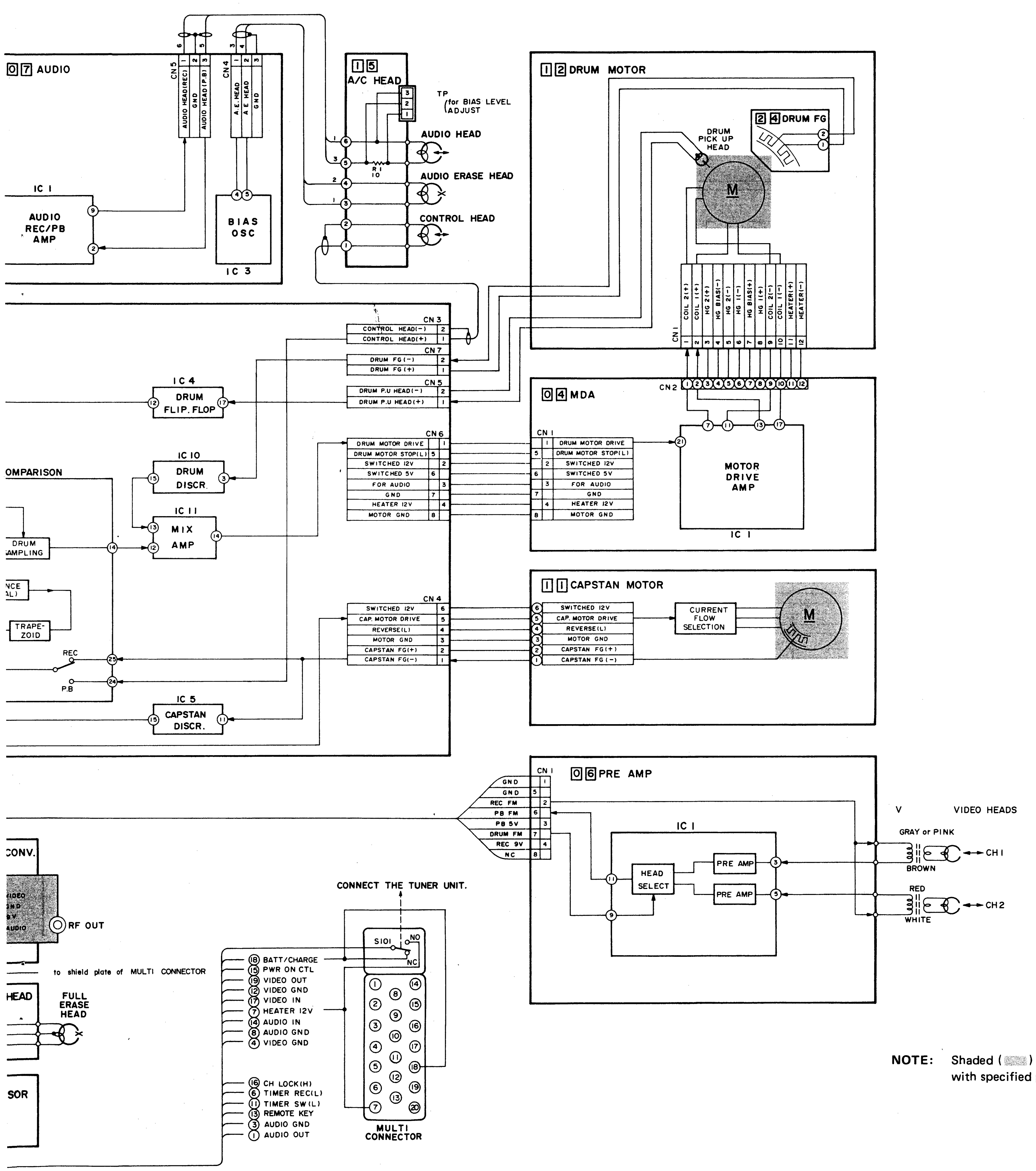


07 AUDIO
CN3
BIAS ON(H)
NC
GND
SWITCHED 12V
NC
REC MUTE(H)
AUDIO PB(H)
CN1
AUDIO IN
GND
CN2
AUDIO MUTE(H)
GND
AUDIO OUT
AUDIO OUT
CN5
AUDIO HEAD(REC)
GND
AUDIO HEAD(P.B)
CN4
A.E. HEAD
A.E. HEAD
GND
MICROPHONE
J01
J001
J02
EARPHONE
IC 1
AUDIO REC/PB AMP
BIAS OSC
IC 3
15 A/C HEAD
TP (for BIAS LEVEL ADJUST
AUDIO HEAD
AUDIO ERASE HEAD
CONTROL HEAD
R1 10
12 DRUM MOTOR
24 DRUM FG
DRUM PICK UP HEAD
M
CN1
COIL 2(+)
COIL 1(+)
HG 2(+)
HG BIAS(-)
HG 2(-)
HG 1(-)
HG BIAS(+)
HG 1(+)
COIL 2(-)
COIL 1(-)
HEATER(+)
HEATER(-)
03 SERVO
CN3
CONTROL HEAD(-)
CONTROL HEAD(+)
CN7
DRUM FG(-)
DRUM FG(+)
CN5
DRUM P.U HEAD(-)
DRUM P.U HEAD(+)
CN6
DRUM MOTOR DRIVE
DRUM MOTOR STOP(L)
SWITCHED 12V
SWITCHED 5V
FOR AUDIO
GND
HEATER 12V
MOTOR GND
CN4
SWITCHED 12V
CAP. MOTOR DRIVE
REVERSE(L)
MOTOR GND
CAPSTAN FG(+)
CAPSTAN FG(-)
CN8
CN1
SLOW/STILL (L)
SERVO MODE(H)
DRUM PHASE CTL(H)
E
F
CAPSTAN FG
DRUM MOTOR STOP(L)
NC
CAP.PHASE CTL(H)
GND
V. PULSE ON(H)
SWITCHED 5V
REVERSE (H)
CAP. SERVO ERROR
VIDEO SQUELCH(H)
DRUM FF
SWITCHED 12V
BATTERY 12V
CTL PULSE
BATTERY 12V
BATTERY 12V
CN9
CN2
GND
CAP.MOTOR DRIVE
MOTOR GND
V. PULSE
HEATER 12V
PB FM
SYNC
SP(L)
BATTERY GND
D
BATTERY GND
C
IC 4
DRUM FLIP. FLOP
IC 10
DRUM DISCR.
IC 11
MIX AMP
IC 7 PHASE COMPARISON
REC
P.B
TRAPE-ZOID
DRUM SAMPLING
REFERENCE (CRYSTAL)
CAPSTAN SAMPLING
TRAPE-ZOID
IC 11
MIX AMP
IC 5
CAPSTAN DISCR.
04 MDA
CN2
CN1
DRUM MOTOR DRIVE
DRUM MOTOR STOP(L)
SWITCHED 12V
SWITCHED 5V
FOR AUDIO
GND
HEATER 12V
MOTOR GND
MOTOR DRIVE AMP
IC 1
11 CAPSTAN MOTOR
SWITCHED 12V
CAP. MOTOR DRIVE
REVERSE(L)
MOTOR GND
CAPSTAN FG(+)
CAPSTAN FG(-)
CURRENT FLOW SELECTION
M
LUMINANCE SYSTEM
COLOR SYSTEM
CN6
GND
GND
REC FM
PB FM
PB 5V
DRUM FF
REC 9V
EP(H)
Q303
CN7
END SENSOR(L)
VIDEO
F.E. ON(H)
SWITCHED 9V
REC 9V
GND
AUDIO
VIDEO(to RF CONVERTER)
AUDIO(to RF CONVERTER)
F1
CN11
ALWAYS 12V
BATTERY/CHARGE
POWER ON CTL
VIDEO OUT
VIDEO GND
VIDEO IN
HEATER 12V
AUDIO IN
AUDIO GND
VIDEO GND
VIDEO(to VIDEO OUT)
AUDIO(from TUNER/LINE IN)
CN12
CH.LOCK(H)
TIMER REC(L)
TIMER SW(L)
REMOTE KEY IN
AUDIO GND
AUDIO OUT
NC
VIDEO(from TUNER/LINE)
AUDIO(to AUDIO OUT)
09 OSC
CN1
CN5
GND
VIDEO
CN3
SWITCHED 9V
AUDIO
IC 1
BIAS OSC
CN2
OSC
OSC
REC 9V
CN4
END SENSOR
GND
10 RF CONV.
VIDEO
GND
9V
AUDIO
RF OUT
to shield plate of MULTI CONNECTOR
13 F.E HEAD
FULL ERASE HEAD
19 END SENSOR
CONNECT THE TUNER UNIT.
S101
NO
NC
⑱ BATT/CHARGE
⑮ PWR ON CTL
⑲ VIDEO OUT
⑫ VIDEO GND
⑰ VIDEO IN
⑦ HEATER 12V
⑭ AUDIO IN
⑧ AUDIO GND
④ VIDEO GND
⑯ CH LOCK(H)
⑥ TIMER REC(L)
⑪ TIMER SW(L)
⑬ REMOTE KEY
③ AUDIO GND
① AUDIO OUT
MULTI CONNECTOR
06 PRE AMP
CN1
GND
GND
REC FM
PB FM
PB 5V
DRUM FM
REC 9V
NC
IC 1
HEAD SELECT
PRE AMP
PRE AMP
V
VIDEO HEADS
GRAY or PINK
BROWN
CH1
RED
WHITE
CH2

No.	BOARD NA
01	MECHACO
02	VIDEO
03	SERVO
04	MDA
05	
06	PREAMP
07	AUDIO
08	
09	OSC
10	RF CONVER
11	CAPSTAN MO
12	DRUM MOTO
13	F.E. HEAD
14	
15	A/C HEAD
16	
17	MODE SENS
18	START SENS
19	END SENSO
20	TU SENSO
21	SUP. SENSO
22	
23	
24	DRUM FG

NOTE: Shaded (▨) parts are critical with specified part numbers.

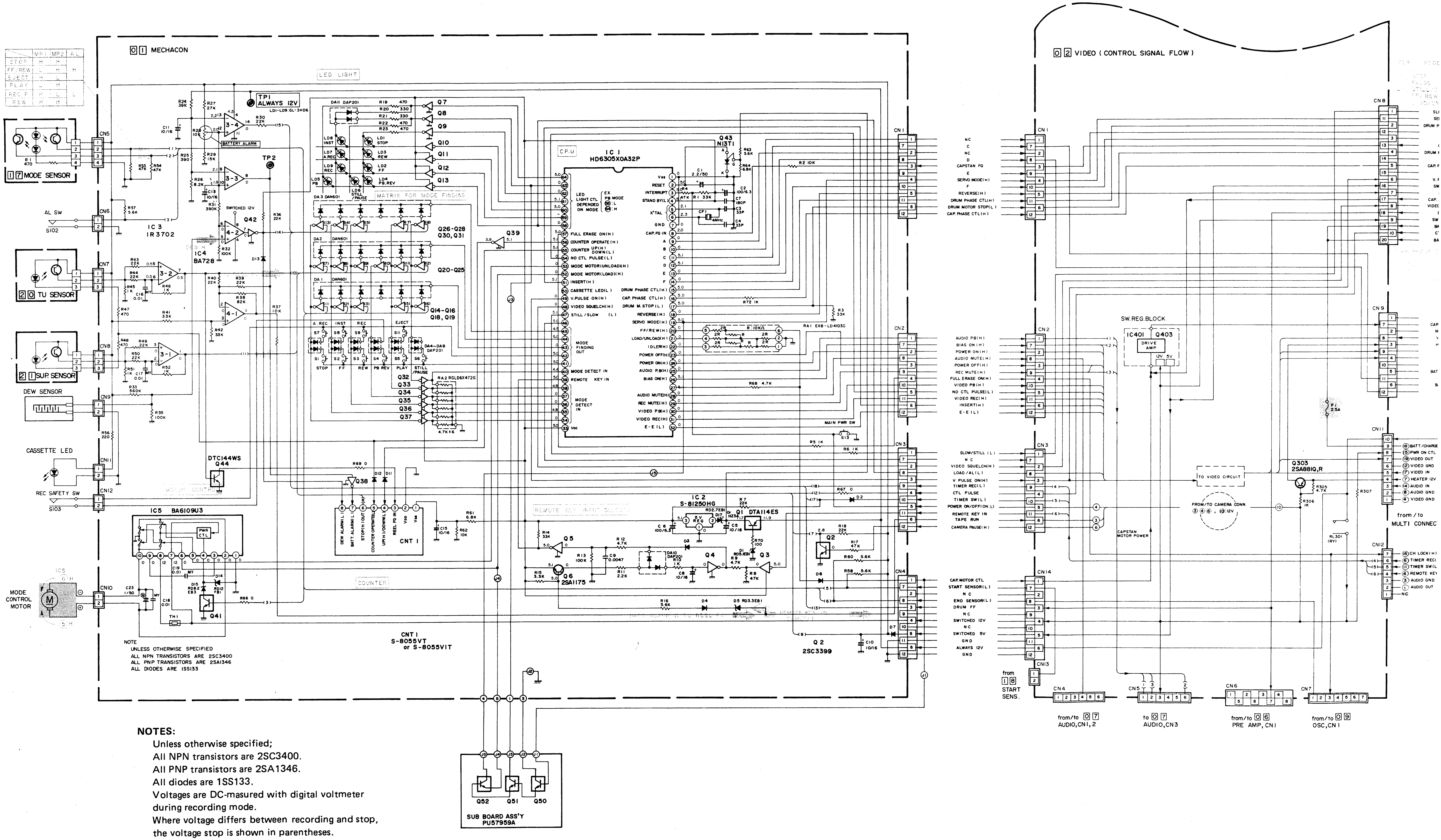
G H I J K 4-13 4-13 M N


07 AUDIO
CN5
AUDIO HEAD(REC)
GND
AUDIO HEAD(P.B)
CN4
A.E. HEAD
A.E. HEAD
GND
IC 1
AUDIO REC/PB AMP
BIAS OSC
IC 3
15 A/C HEAD
TP (for BIAS LEVEL ADJUST
R1 10
AUDIO HEAD
AUDIO ERASE HEAD
CONTROL HEAD
12 DRUM MOTOR
24 DRUM FG
DRUM PICK UP HEAD
M
CN1
COIL 2(+)
COIL 1(+)
HG 2(+)
HG BIAS(−)
HG 2(−)
HG 1(−)
HG BIAS(+)
HG 1(+)
COIL 2(−)
COIL 1(−)
HEATER(+)
HEATER(−)
CN2
CN3
CONTROL HEAD(−)
CONTROL HEAD(+)
CN7
DRUM FG(−)
DRUM FG(+)
CN5
DRUM P.U HEAD(−)
DRUM P.U HEAD(+)
IC 4
DRUM FLIP. FLOP
04 MDA
CN6
DRUM MOTOR DRIVE
DRUM MOTOR STOP(L)
SWITCHED 12V
SWITCHED 5V
FOR AUDIO
GND
HEATER 12V
MOTOR GND
MOTOR DRIVE AMP
IC 1
OMPARISON
IC 10
DRUM DISCR.
IC 11
MIX AMP
DRUM AMPLING
NCE AL)
TRAPE-ZOID
11 CAPSTAN MOTOR
CN4
SWITCHED 12V
CAP. MOTOR DRIVE
REVERSE(L)
MOTOR GND
CAPSTAN FG(+)
CAPSTAN FG(−)
CURRENT FLOW SELECTION
REC
P.B
IC 5
CAPSTAN DISCR.
06 PRE AMP
CN 1
GND
GND
REC FM
PB FM
PB 5V
DRUM FM
REC 9V
NC
IC 1
HEAD SELECT
PRE AMP
PRE AMP
V
VIDEO HEADS
GRAY or PINK
BROWN
RED
WHITE
CH1
CH2
CONV.
IDEO
GND
9V
AUDIO
RF OUT
to shield plate of MULTI CONNECTOR
HEAD
FULL ERASE HEAD
SOR
CONNECT THE TUNER UNIT.
S101
NO
NC
⑱ BATT/CHARGE
⑮ PWR ON CTL
⑲ VIDEO OUT
⑫ VIDEO GND
⑰ VIDEO IN
⑦ HEATER 12V
⑭ AUDIO IN
⑧ AUDIO GND
④ VIDEO GND
⑯ CH LOCK(H)
⑥ TIMER REC(L)
⑪ TIMER SW(L)
⑬ REMOTE KEY
③ AUDIO GND
① AUDIO OUT
MULTI CONNECTOR

No.	BOARD NAME
01	MECHACON
02	VIDEO
03	SERVO
04	MDA
05	
06	PREAMP
07	AUDIO
08	
09	OSC
10	RF CONVERTER
11	CAPSTAN MOTOR
12	DRUM MOTOR
13	F.E. HEAD
14	
15	A/C HEAD
16	
17	MODE SENSOR
18	START SENSOR
19	END SENSOR
20	TU SENSOR
21	SUP. SENSOR
22	
23	
24	DRUM FG

NOTE: Shaded (▨) parts are critical for safety. Replace only with specified part numbers.

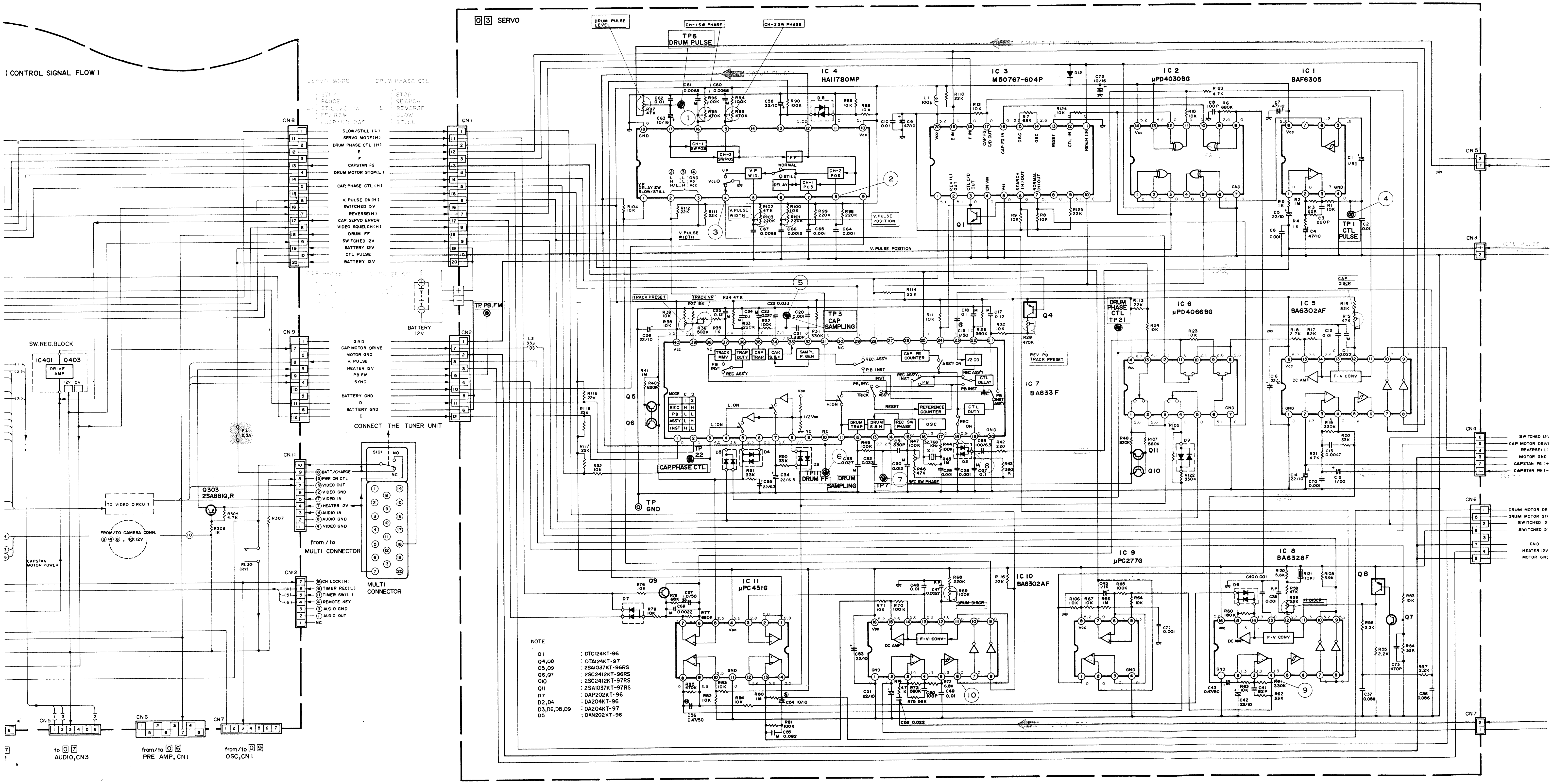
4.12 MECHACON, SERVO & MDA SCHEMATIC DIAGRAM



01 MECHACON
02 VIDEO (CONTROL SIGNAL FLOW)
LED LIGHT
TP1 ALWAYS 12V
TP2
BATTERY ALARM
17 MODE SENSOR
AL SW
S102
20 TU SENSOR
21 SUP. SENSOR
DEW SENSOR
CASSETTE LED
REC SAFETY SW
S103
MODE CONTROL MOTOR
IC3 IR3702
IC4 BA728
IC5 BA6109U3
IC1 HD6305X0A32P
C.P.U
Q43 N13T1
IC2 S-81250HG
Q1 DTA114ES
Q6 2SA1175
Q2 2SC3399
Q44 DTC144WS
Q303 2SA881Q,R
CNT1 S-8055VT or S-8055VIT
MATRIX FOR MODE FINDING
Q26-Q28 Q30,Q31
Q20-Q25
Q14-Q16 Q18,Q19
Q32 Q33 Q34 Q35 Q36 Q37
STOP FF REW PB REV PLAY STILL /PAUSE
A.REC INST REC EJECT
MAIN PWR SW
COUNTER
SW.REG.BLOCK
IC401 Q403
DRIVE AMP
TO VIDEO CIRCUIT
FROM/TO CAMERA CONN
SUB BOARD ASS'Y PU57959A
Q52 Q51 Q50
from 18 START SENS.
from/to 07 AUDIO,CN1,2
to 07 AUDIO,CN3
from/to 06 PRE AMP, CN1
from/to 09 OSC,CN1
from/to MULTI CONNECT
CAPSTAN MOTOR POWER
NOTE
UNLESS OTHERWISE SPECIFIED
ALL NPN TRANSISTORS ARE 2SC3400
ALL PNP TRANSISTORS ARE 2SA1346
ALL DIODES ARE 1SS133

NOTES:

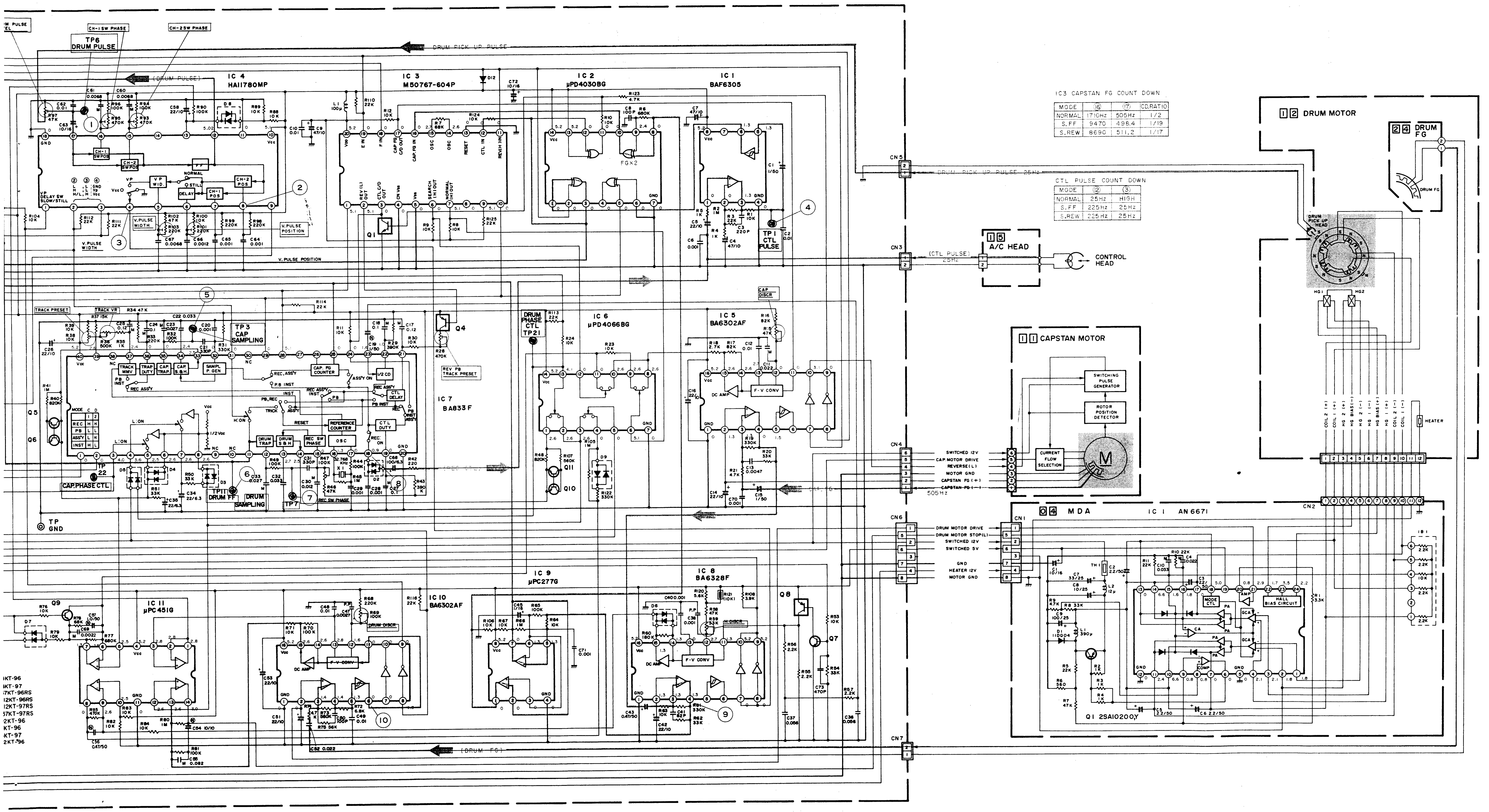
Unless otherwise specified;
All NPN transistors are 2SC3400.
All PNP transistors are 2SA1346.
All diodes are 1SS133.
Voltages are DC-masured with digital voltmeter during recording mode.
Where voltage differs between recording and stop, the voltage stop is shown in parentheses.


(CONTROL SIGNAL FLOW)
03 SERVO
IC 4
HA11780MP
IC 3
M50767-604P
IC 2
μPD4030BG
IC 1
BAF6305
IC 6
μPD4066BG
IC 5
BA6302AF
IC 7
BA833F
IC 11
μPC451G
IC 10
BA6302AF
IC 9
μPC277G
IC 8
BA6328F
TP6
DRUM PULSE
DRUM PULSE LEVEL
CH-1 SW PHASE
CH-2 SW PHASE
TP 1
CTL PULSE
TP 3
CAP SAMPLING
TP 21
DRUM PHASE CTL
TP 22
CAP.PHASE CTL
TP11
DRUM FF
DRUM SAMPLING
TP7
TP GND
TP PB.FM
TRACK PRESET
TRACK VR
REV PB TRACK PRESET
V.PULSE WIDTH
V.PULSE POSITION
REC SW PHASE
DRUM DISCR
M.DISCR
CAP DISCR
CN8
SLOW/STILL (L)
SERVO MODE(H)
DRUM PHASE CTL (H)
E
F
CAPSTAN FG
DRUM MOTOR STOP(L)
CAP. PHASE CTL (H)
V. PULSE ON(H)
SWITCHED 5V
REVERSE(H)
CAP. SERVO ERROR
VIDEO SQUELCH(H)
DRUM FF
SWITCHED 12V
BATTERY 12V
CTL PULSE
BATTERY 12V
CN1
CN9
GND
CAP.MOTOR DRIVE
MOTOR GND
V. PULSE
HEATER 12V
PB FM
SYNC
BATTERY GND
D
BATTERY GND
C
CN2
CONNECT THE TUNER UNIT
BATTERY 12V
SW.REG.BLOCK
IC401
Q403
DRIVE AMP
F1 2.5A
CN11
BATT/CHARGE
PWR ON CTL
VIDEO OUT
VIDEO GND
VIDEO IN
HEATER 12V
AUDIO IN
AUDIO GND
VIDEO GND
S101
NO
NC
from / to MULTI CONNECTOR
MULTI CONNECTOR
Q303
2SA881Q,R
TO VIDEO CIRCUIT
FROM/TO CAMERA CONN.
CAPSTAN MOTOR POWER
RL301 (RY)
CN12
CH LOCK(H)
TIMER REC(L)
TIMER SW(L)
REMOTE KEY
AUDIO GND
AUDIO OUT
NC
CN5
to 07 AUDIO,CN3
CN6
from/to 06 PRE AMP, CN1
CN7
from/to 09 OSC,CN1
CN5
CN3
CN4
SWITCHED 12V
CAP.MOTOR DRIVE
REVERSE(L)
MOTOR GND
CAPSTAN FG(+)
CAPSTAN FG(-)
CN6
DRUM MOTOR DR
DRUM MOTOR ST
SWITCHED 12
SWITCHED 5
GND
HEATER 12V
MOTOR GND
CN7
Q1
Q4
Q5
Q6
Q7
Q8
Q9
Q10
Q11
D2
D3
D4
D5
D6
D7
D8
D9
D12

NOTE

Q1	: DTC124KT-96
Q4,Q8	: DTA124KT-97
Q5,Q9	: 2SA1037KT-96RS
Q6,Q7	: 2SC2412KT-96RS
Q10	: 2SC2412KT-97RS
Q11	: 2SA1037KT-97RS
D7	: DAP202KT-96
D2,D4	: DA204KT-96
D3,D6,D8,D9	: DA204KT-97
D5	: DAN202KT-96

NOTES: Unless otherwise specified;
All diodes are 1SS133.
All capacitors are in microfards, industors are
in henries, resistors are in ohms (1/6 W).
(   ) represents the DC voltage at playback mode
Shaded (▨) parts are critical for safety. Replace only
with opecified part numbers.


TP6 DRUM PULSE
CH-1 SW PHASE
CH-2 SW PHASE
DRUM PICK UP PULSE
(DRUM PULSE)
IC 4 HA11780MP
IC 3 M50767-604P
IC 2 μPD4030BG
IC 1 BAF6305
IC 6 μPD4066BG
IC 5 BA6302AF
IC 7 BA833F
IC 9 μPC277G
IC 8 BA6328F
IC 10 BA6302AF
IC 11 μPC451G
TP3 CAP SAMPLING
TRACK PRESET
TRACK VR
REV PB TRACK PRESET
DRUM PHASE CTL TP21
CAP DISCR
TP1 CTL PULSE
TP 22 CAP.PHASE CTL
TP11 DRUM FF
DRUM SAMPLING
TP7
TP GND
V.PULSE WIDTH
V.PULSE POSITION
DRUM DISCR
(DRUM FG)
CN5
CN3
CN4
CN6
CN7
CN2
CN1
DRUM PICK UP PULSE 25Hz
(CTL PULSE) 25Hz
15 A/C HEAD
CONTROL HEAD
12 DRUM MOTOR
24 DRUM FG
DRUM PICK UP HEAD
HG1
HG2
11 CAPSTAN MOTOR
SWITCHING PULSE GENERATOR
ROTOR POSITION DETECTOR
CURRENT FLOW SELECTION
M
SWITCHED 12V
CAP MOTOR DRIVE
REVERSE(L)
MOTOR GND
CAPSTAN FG (+)
CAPSTAN FG (-)
505Hz
DRUM MOTOR DRIVE
DRUM MOTOR STOP(L)
SWITCHED 12V
SWITCHED 5V
GND
HEATER 12V
MOTOR GND
04 MDA
IC 1 AN6671
Q1 2SA1020O,Y
HALL BIAS CIRCUIT
MODE CTL
COIL 2 (+)
COIL 1 (+)
HG 2 (+)
HG BIAS(+)
HG 1 (-)
HG BIAS(-)
HG 1 (+)
COIL 1 (-)
COIL 2 (-)
HEATER

IC3 CAPSTAN FG COUNT DOWN

MODE	⑯	⑰	CD.RATIO
NORMAL	1710Hz	505Hz	1/2
S.FF	9470	498.4	1/19
S.REW	8690	511.2	1/17

CTL PULSE COUNT DOWN

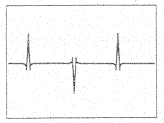
MODE	⑫	③
NORMAL	25Hz	HIGH
S.FF	225Hz	25Hz
S.REW	225Hz	25Hz

KT-96
KT-97
7KT-96RS
2KT-96RS
2KT-97RS
7KT-97RS
2KT-96
KT-96
KT-97
2KT-96

NOTES: Unless otherwise specified;
All diodes are 1SS133.
All capacitors are in microfards, industors are
in henries, resistors are in ohms (1/6 W).
( ) represents the DC voltage at playback mode
Shaded (▨) parts are critical for safety. Replace only
with opecified part numbers.

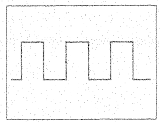
– Main waveforms of servo circuit –

1



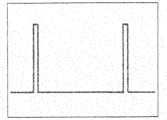
TP6
DRUM PULSE
1.4 Vp-p

2



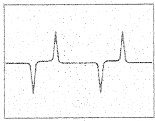
Pin ⑧ of IC4
CH1, 2 position
5 Vp-p

3



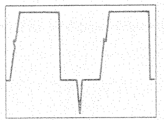
Pin ④ of IC4
V. pulse
5 Vp-p

4



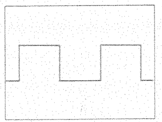
TP1
C.T.L pulse
0.8 Vp-p

5



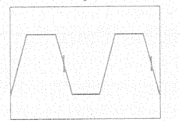
TP3
CAPSTAN
SAMPLING
5.0 Vp-p

6



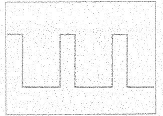
TP11
DRUM FF
5 Vp-p

7



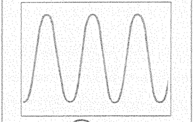
TP7
DRUM SAMPLING
5 Vp-p

8



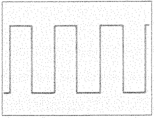
Pin ⑱ of IC7
REC CTL
4 Vp-p

9



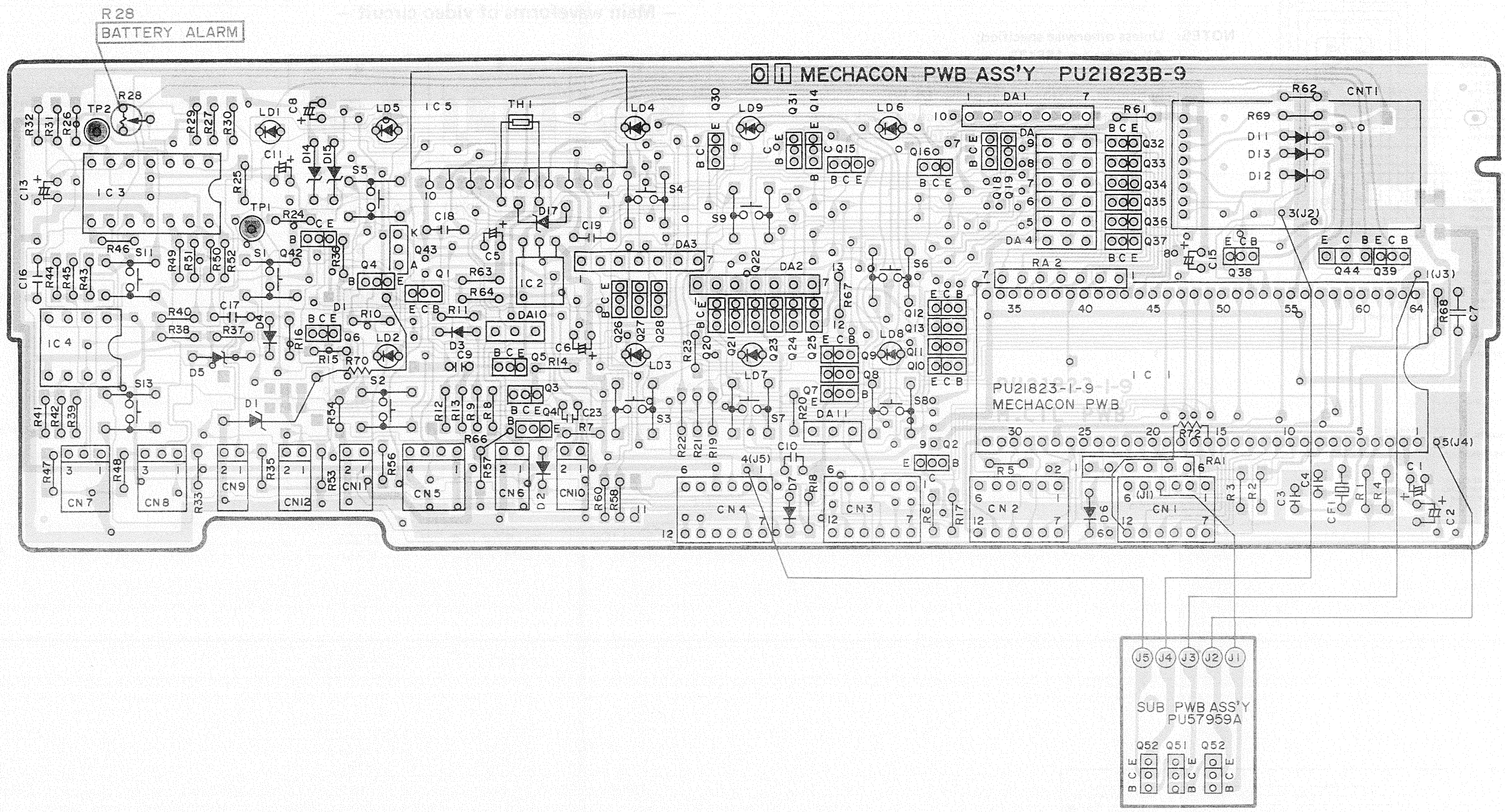
Pin ④ of IC8
CAPSTAN FG
2 Vp-p

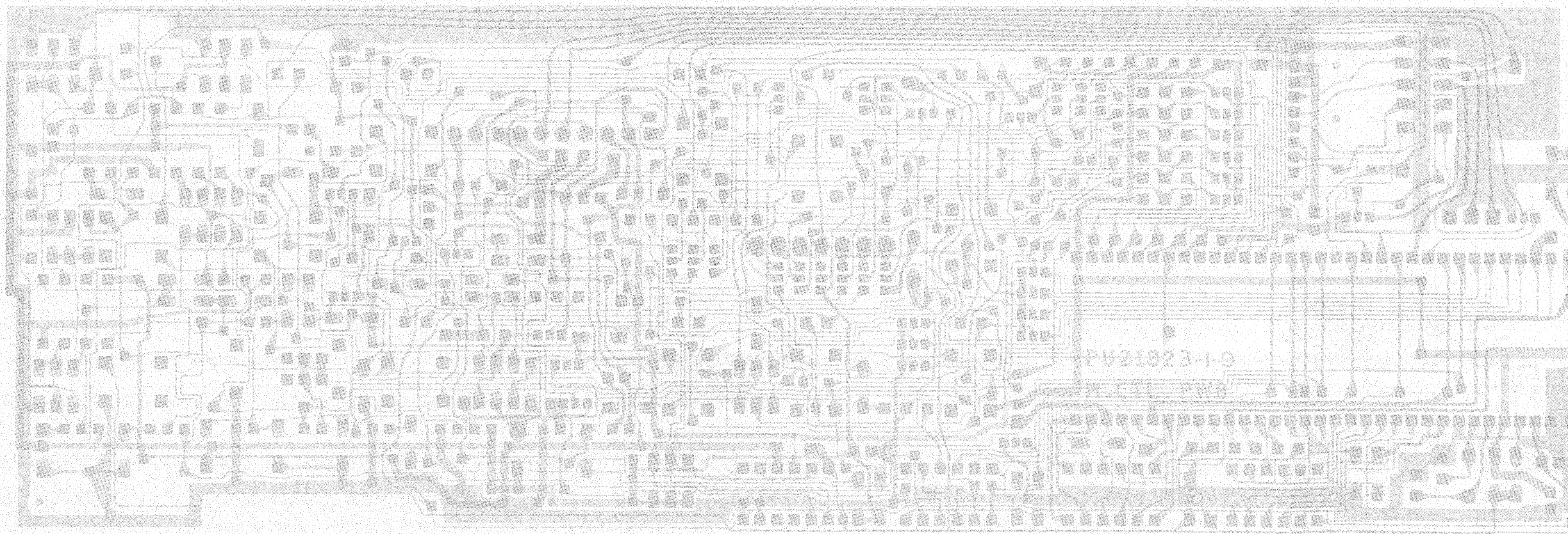
10

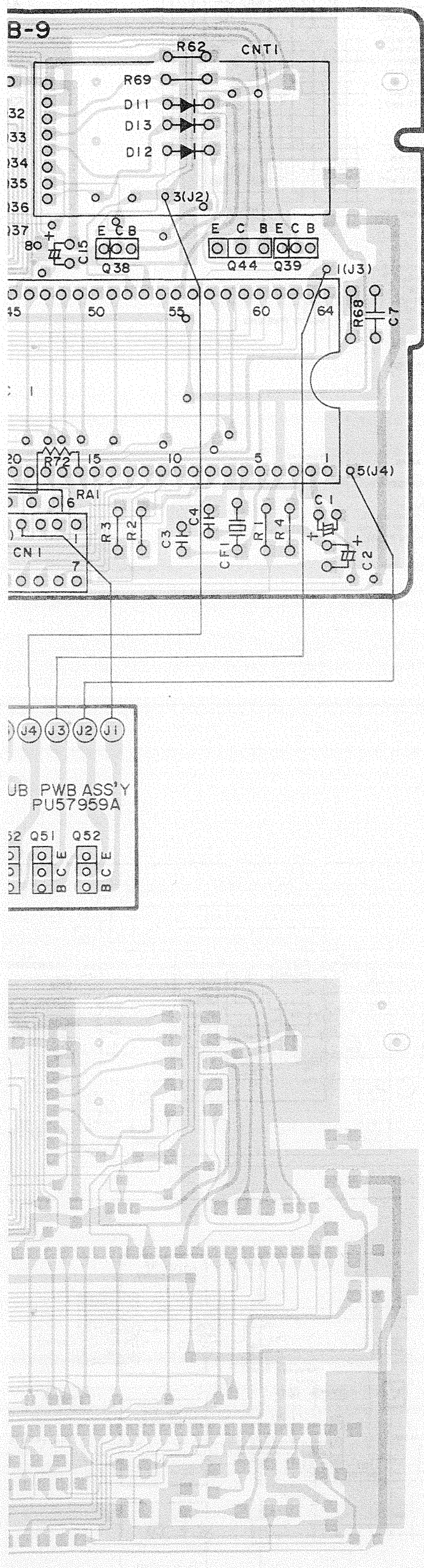


Pin ⑥ of IC10
DRUM FG
4.5 Vp-p

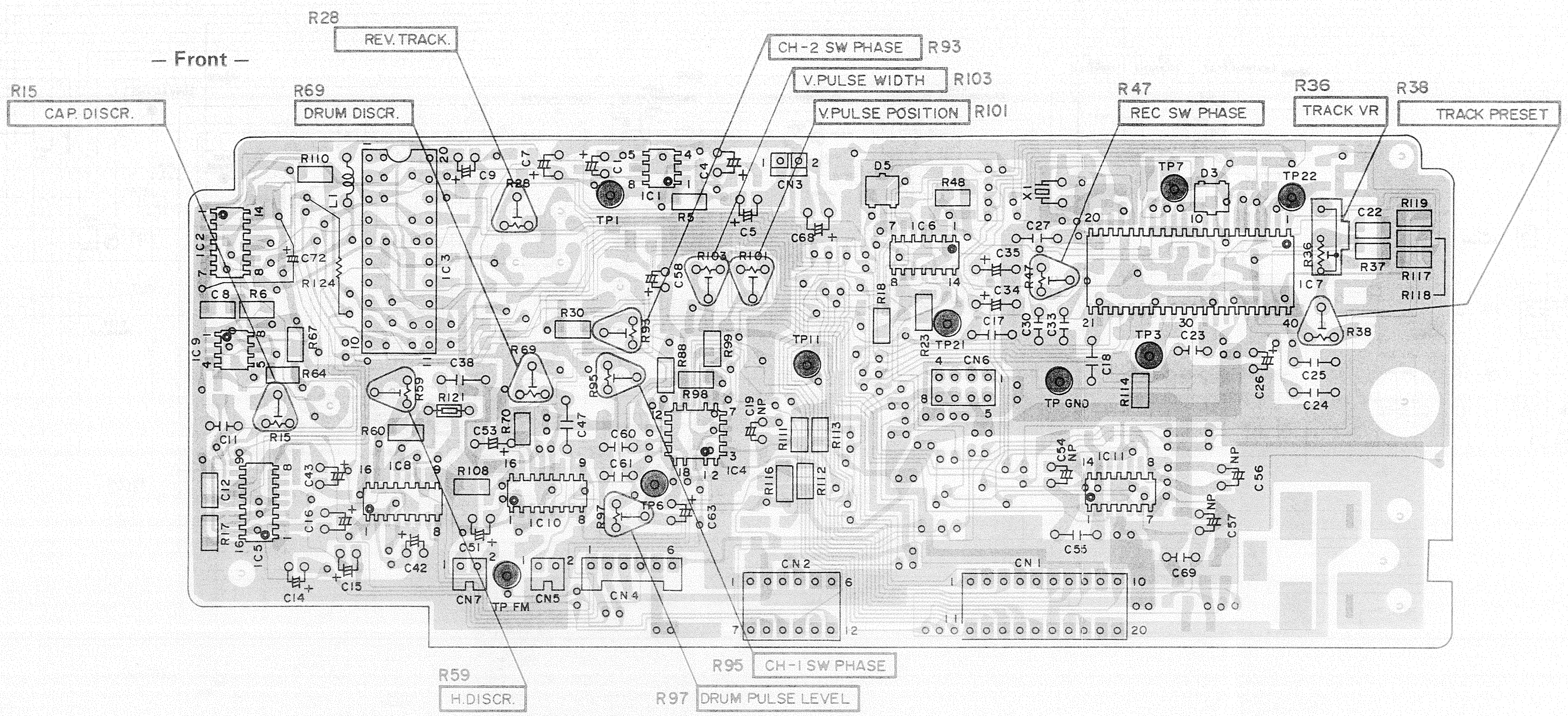
4.13 MECHACON BOARD

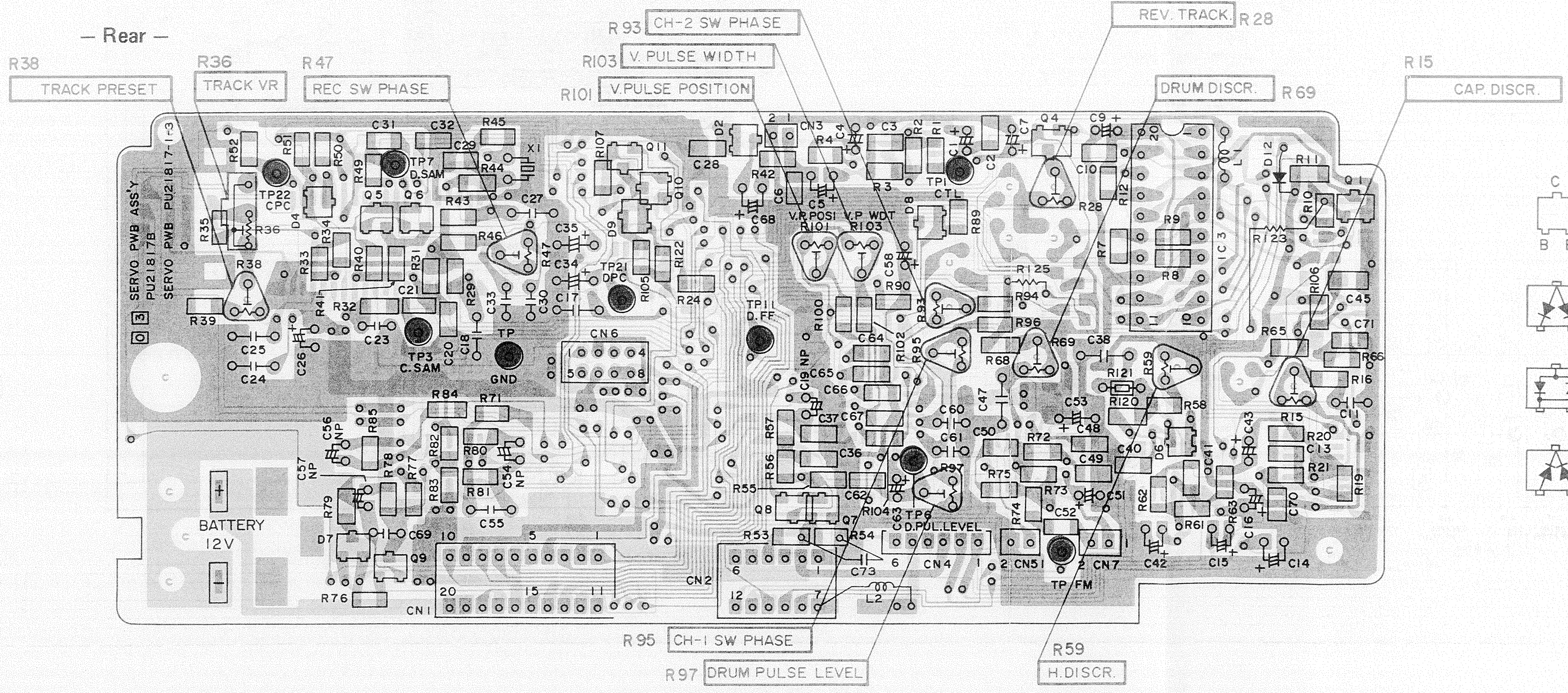

R28
BATTERY ALARM
01 MECHACON PWB ASS'Y PU21823B-9
PU21823-I-9
MECHACON PWB
IC1
IC2
IC3
IC4
IC5
TH1
CN1
CN2
CN3
CN4
CN5
CN6
CN7
CN8
CN9
CN10
CN11
CN12
CNT1
DA1
DA2
DA3
DA4
RA1
RA2
TP1
TP2
LD1
LD2
LD3
LD4
LD5
LD6
LD7
LD8
LD9
S1
S2
S3
S4
S5
S6
S7
S8
S9
S11
S13
1(J1)
3(J2)
1(J3)
5(J4)
4(J5)
J5 J4 J3 J2 J1
SUB PWB ASS'Y
PU57959A
Q52 Q51 Q52
B C E

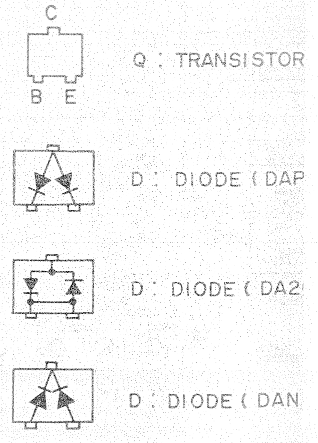

PU21823-I-9
M.CTL PWB


B-9
R62
CNT1
R69
D11
D13
D12
3(J2)
Q38
Q44
Q39
1(J3)
R68
C7
5(J4)
RA1
CN1
J4 J3 J2 J1
UB PWB ASS'Y
PU57959A
Q51 Q52

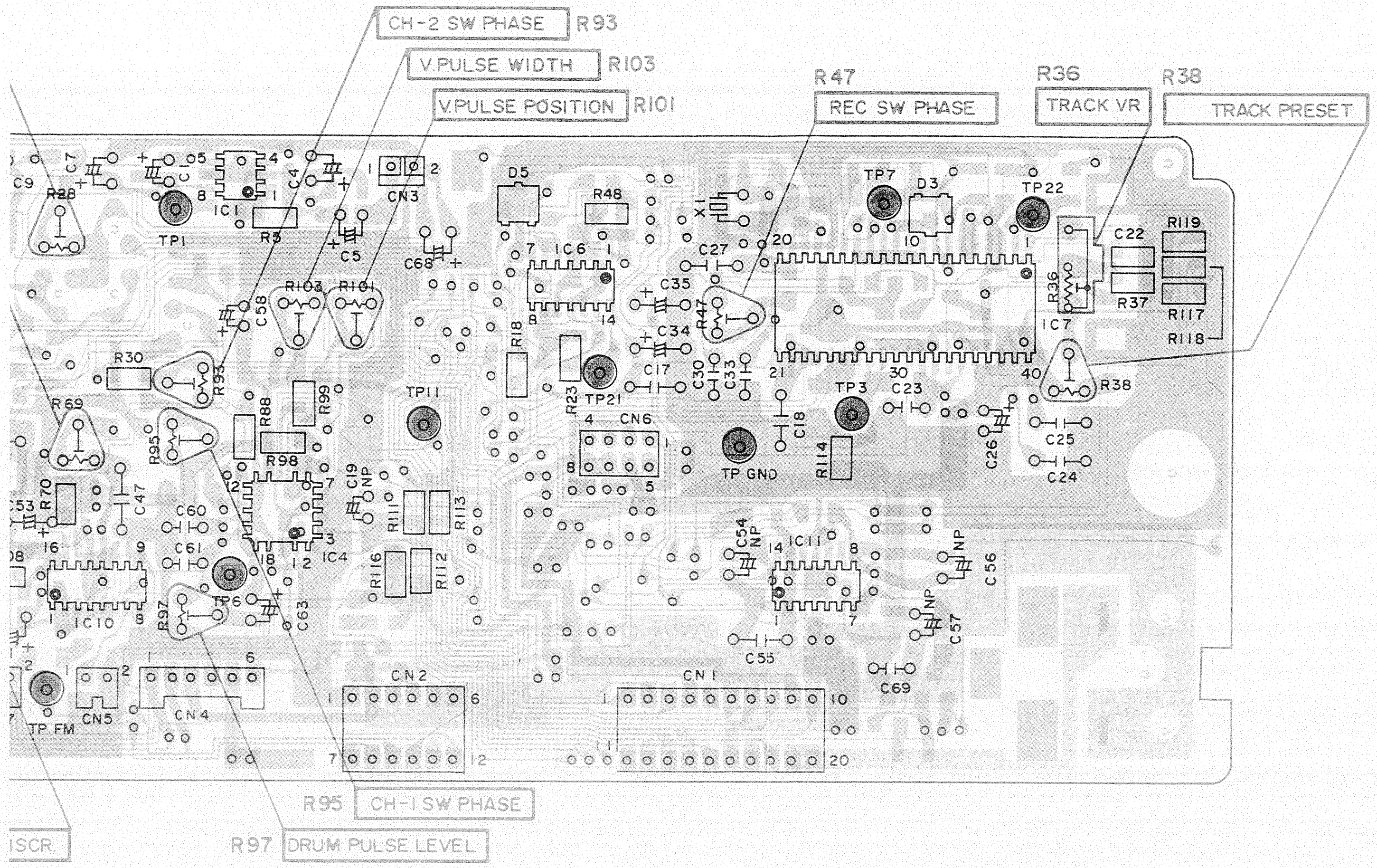
4.14 SERVO BOARD

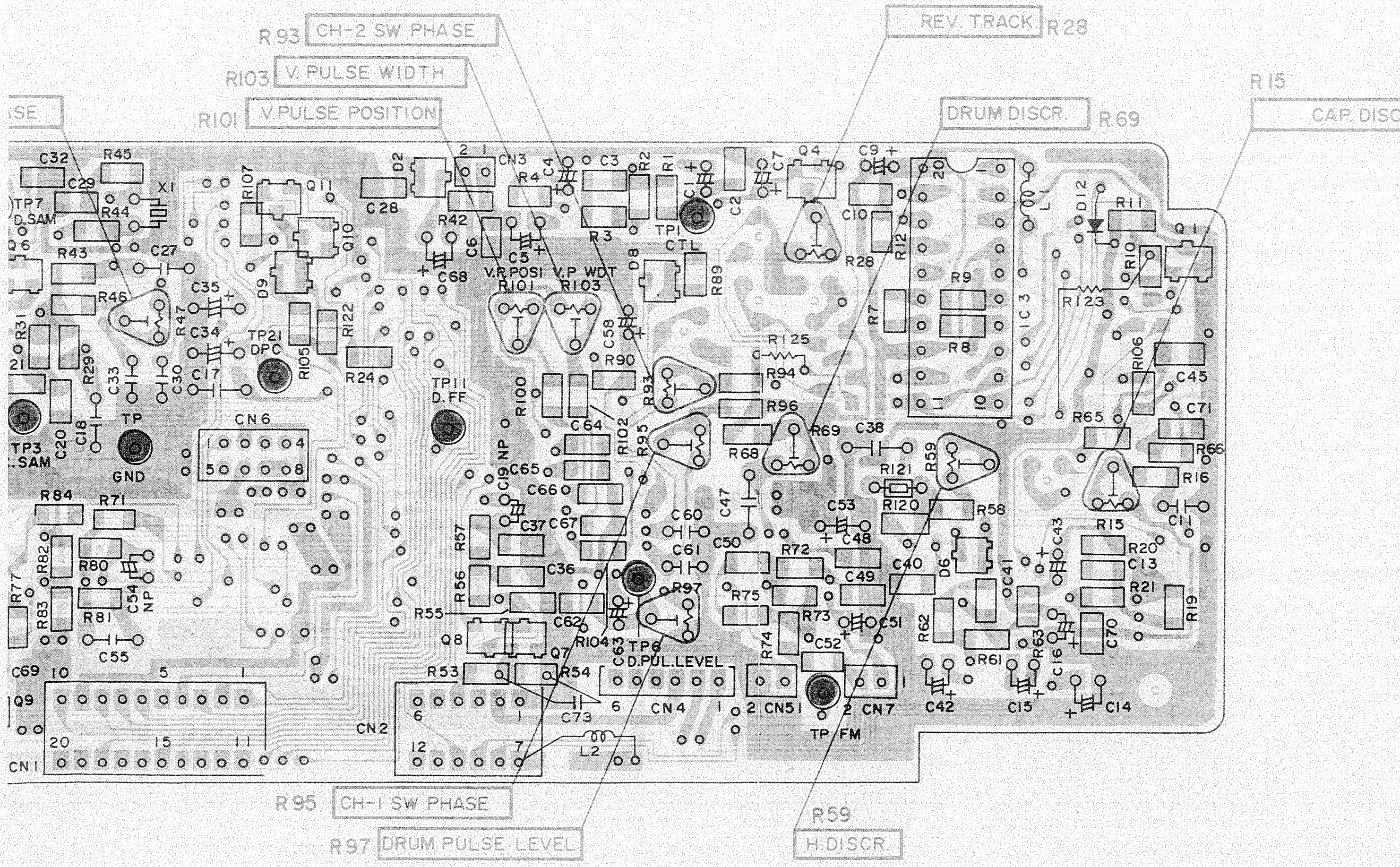

– Front –
R28 REV. TRACK.
CH-2 SW PHASE R93
V.PULSE WIDTH R103
V.PULSE POSITION R101
R15 CAP. DISCR.
R69 DRUM DISCR.
R47 REC SW PHASE
R36 TRACK VR
R38 TRACK PRESET
TP1
TP7
TP22
TP11
TP21
TP3
TP GND
TP6
TP FM
IC1
IC2
IC3
IC4
IC6
IC7
IC8
IC9
IC10
IC11
CN1
CN2
CN3
CN4
CN5
CN6
CN7
R95 CH-1 SW PHASE
R97 DRUM PULSE LEVEL
R59 H.DISCR.


– Rear –
R93 CH-2 SW PHASE
R103 V. PULSE WIDTH
R101 V.PULSE POSITION
REV. TRACK. R28
DRUM DISCR. R69
R15 CAP. DISCR.
R38 TRACK PRESET
R36 TRACK VR
R47 REC SW PHASE
SERVO PWB ASS'Y PU21817B
SERVO PWB PU21817-1-3
TP22 CPC
TP7 D.SAM
TP21 DPC
TP1 CTL
TP11 D.FF
TP3 C.SAM
TP GND
V.P POSI
V.P WDT
TP6 D.PUL.LEVEL
TP FM
BATTERY 12V
CN1
CN2
CN3
CN4
CN51
CN7
CN6
R95 CH-1 SW PHASE
R97 DRUM PULSE LEVEL
R59 H.DISCR.

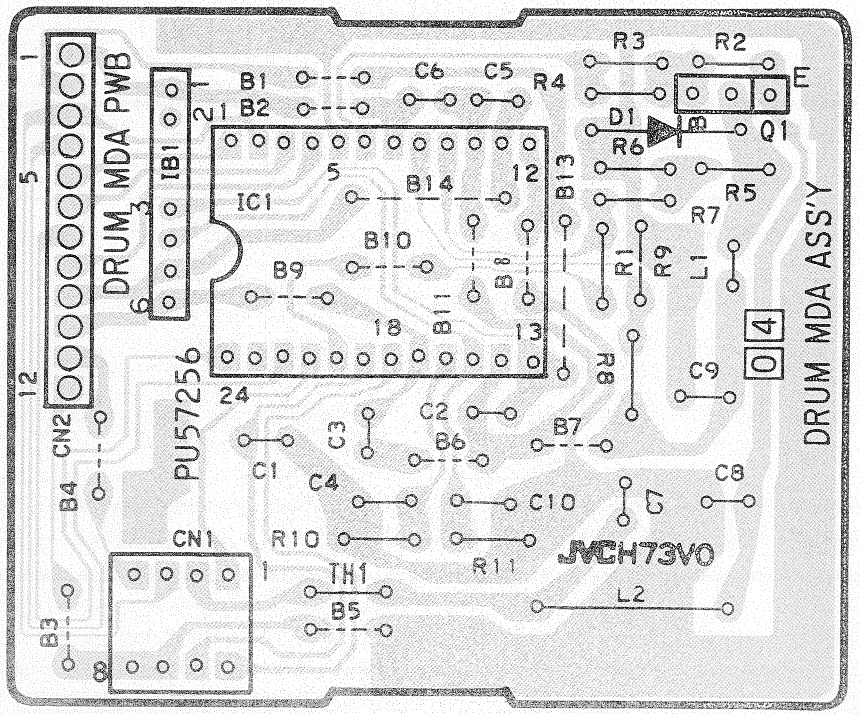

C
B E
Q : TRANSISTOR
D : DIODE (DAP
D : DIODE (DA2
D : DIODE (DAN

G H I J K 4-15 4-15 M N

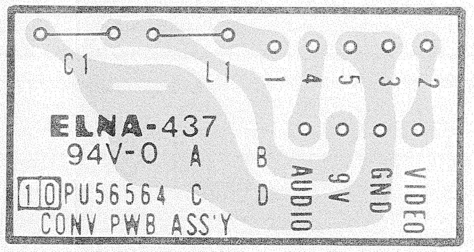

CH-2 SW PHASE R93
V.PULSE WIDTH R103
V.PULSE POSITION R101
R47 REC SW PHASE
R36 TRACK VR
R38 TRACK PRESET
R95 CH-1 SW PHASE
R97 DRUM PULSE LEVEL
ISCR.
TP1
TP7
TP22
TP11
TP21
TP3
TP GND
TP6
TP FM
IC1
IC6
IC7
IC4
IC10
IC11
CN1
CN2
CN3
CN4
CN5
CN6

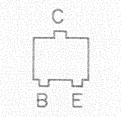

R93 CH-2 SW PHASE
R103 V. PULSE WIDTH
R101 V.PULSE POSITION
REV. TRACK R28
DRUM DISCR. R69
R15 CAP. DISCR.
ASE
R95 CH-1 SW PHASE
R97 DRUM PULSE LEVEL
R59 H.DISCR.
TP7 D.SAM
TP21 DPC
TP11 D.FF
TP3 C.SAM
TP GND
TP1 CTL
TP6 D.PUL.LEVEL
TP FM
V.P.POSI
V.P WDT
IC3
CN1
CN2
CN3
CN4
CN51
CN6
CN7

– MDA –

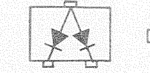

DRUM MDA PWB
DRUM MDA ASS'Y
PU57256
JVC H73V0
IC1
CN1
CN2
IB1
Q1
D1
E
04

– CONV. –

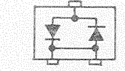

C1
L1
ELNA-437
94V-0
A
B
C
D
10 PU56564
CONV PWB ASS'Y
AUDIO
9V
GND
VIDEO



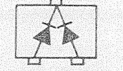
Q : TRANSISTOR



D : DIODE (DAP202K)

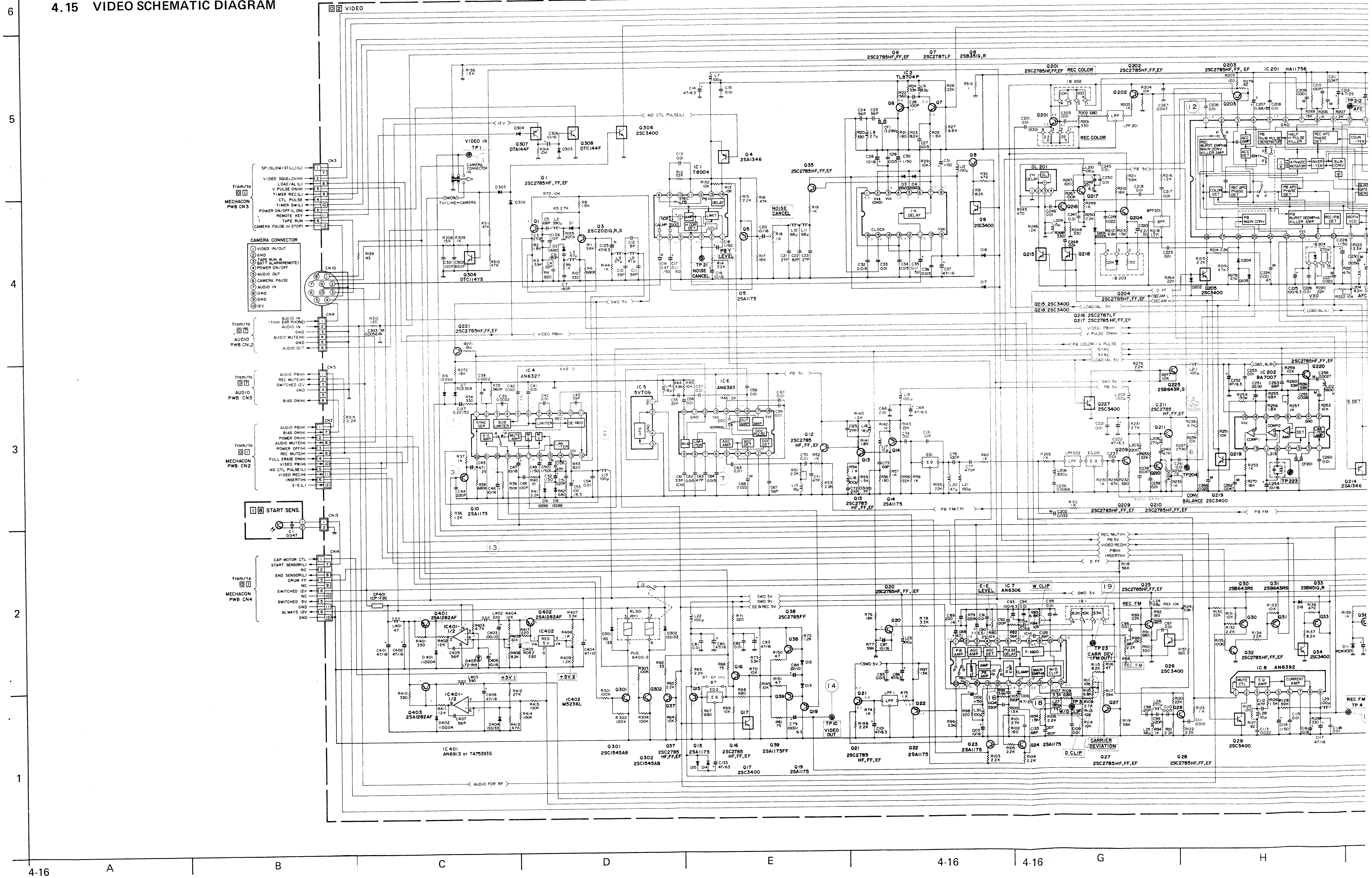


D : DIODE (DA204K)



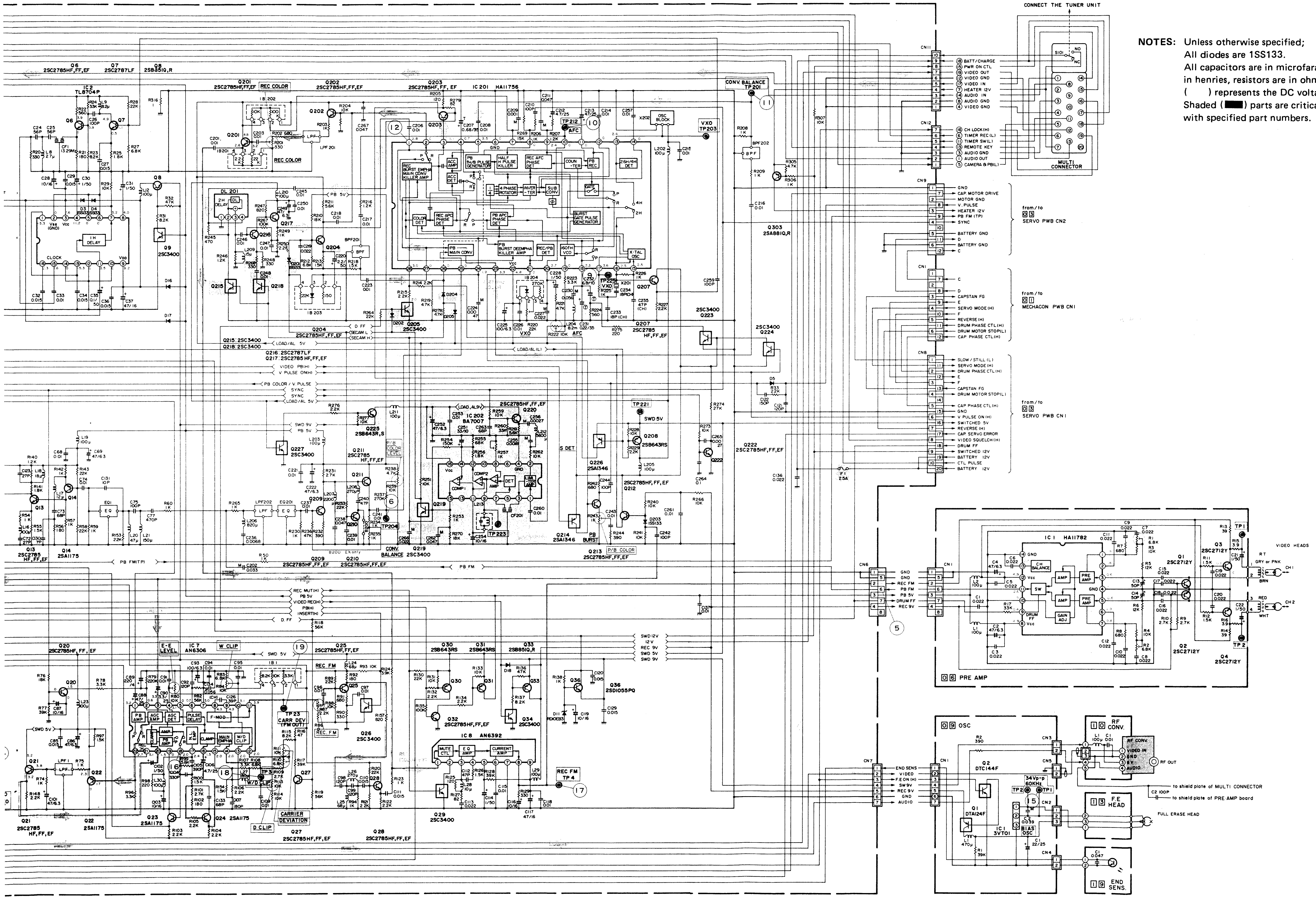
D : DIODE (DAN202K)

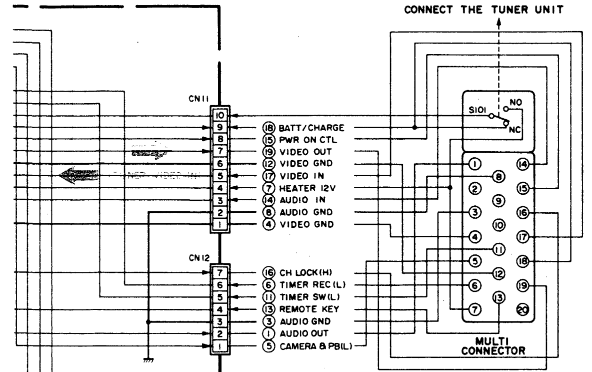
4.15 VIDEO SCHEMATIC DIAGRAM



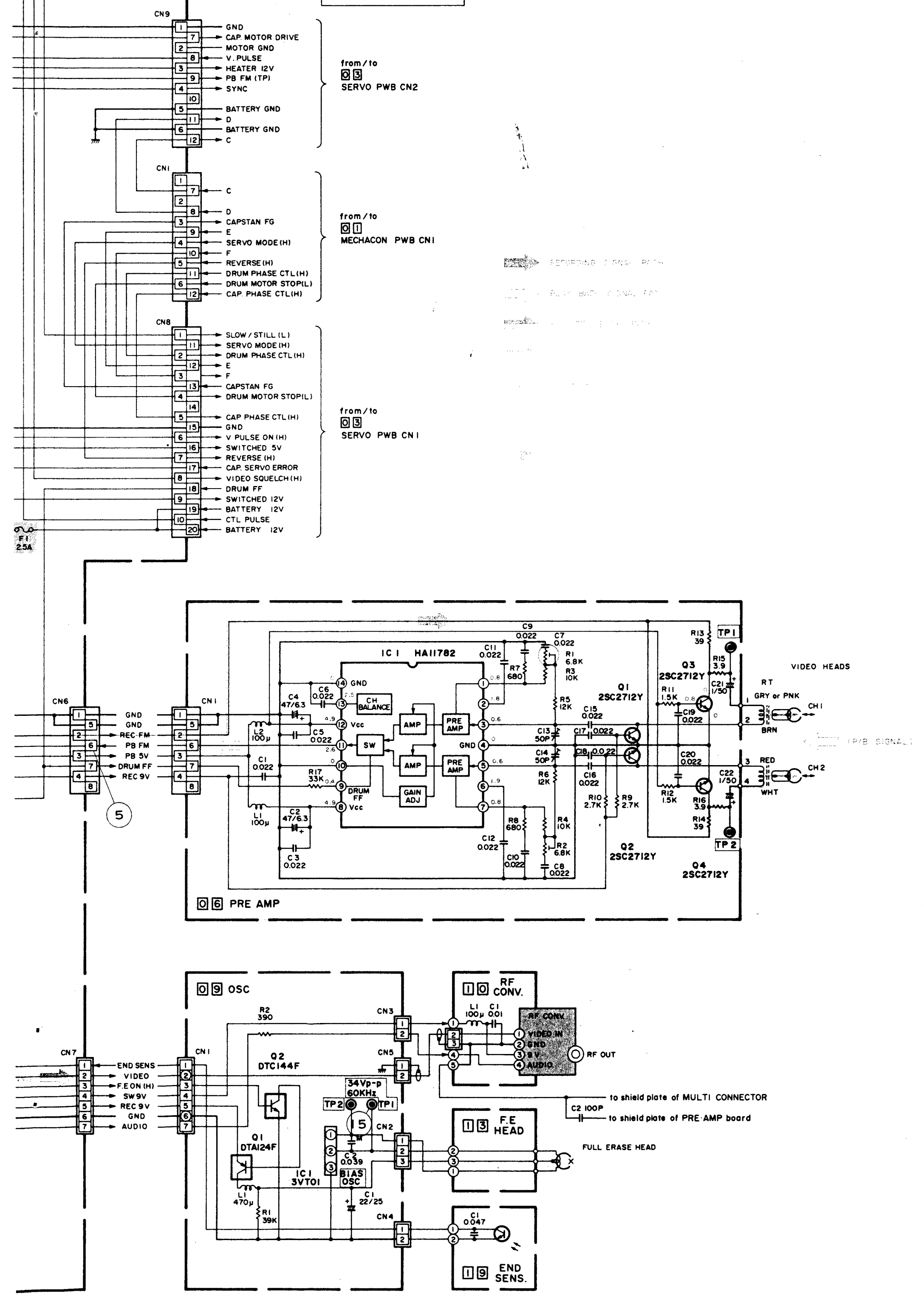
02 VIDEO
from/to 01 MECHACON PWB CN3
SP (SLOW/STILL)(L)
VIDEO SQUELCH(H)
LOAD/AL (L)
V PULSE ON(H)
TIMER REC(L)
CTL PULSE
TIMER SW(L)
POWER ON/OFF (L:ON)
REMOTE KEY
TAPE RUN
CAMERA PAUSE (H:STOP)
CAMERA CONNECTOR
① VIDEO IN/OUT
② GND
③ TAPE RUN & BATT ALARM(REMOTE)
④ POWER ON/OFF
⑤ AUDIO OUT
⑥ CAMERA PAUSE
⑦ AUDIO IN
⑧ GND
⑨ GND
⑩ 12V
CN10
from/to 07 AUDIO PWB CN12
AUDIO IN (from EAR PHONE)
AUDIO IN
GND
AUDIO MUTE(H)
GND
AUDIO OUT
from/to 07 AUDIO PWB CN3
AUDIO PB(H)
REC MUTE(H)
SWITCHED 12V
GND
BIAS ON(H)
from/to 01 MECHACON PWB CN2
AUDIO PB(H)
BIAS ON(H)
POWER ON(H)
AUDIO MUTE(H)
POWER OFF(H)
REC MUTE(H)
FULL ERASE ON(H)
VIDEO PB(H)
NO CTL PULSE(L)
VIDEO REC(H)
INSERT(H)
E-E(L)
18 START SENS.
from/to 01 MECHACON PWB CN4
CAP MOTOR CTL
START SENSOR(L)
NC
END SENSOR(L)
DRUM FF
NC
SWITCHED 12V
NC
SWITCHED 5V
GND
ALWAYS 12V
GND
VIDEO IN TP1
CAMERA CONNECTOR IN
TV/LINE—CAMERA
Q307 DTA144F
Q308 DTC144F
Q306 2SC3400
Q304 DTC114YS
Q1 2SC2785HF, FF, EF
Q3 2SC2021Q,R,S
IC1 T8004
Q4 2SA1346
TP21 NOISE CANCEL
PB Y LEVEL
NOISE CANCEL
Q5 2SA1175
Q35 2SC2785HF, FF, EF
IC2 TL8704P
Q6 2SC2785HF, FF, EF
Q7 2SC2787LF
Q8 2SB3510,R
Q9 2SC3400
1H DELAY
CLOCK
Q201 2SC2785HF,FF,EF
REC COLOR
Q202 2SC2785HF,FF,EF
Q203 2SC2785HF, FF, EF
IC201 HA11756
LPF 201
DL201 2H DELAY
Q216 2SC2787LF
Q217 2SC2785HF,FF,EF
Q215 2SC3400
Q218 2SC3400
Q204 2SC2785HF,FF,EF
BPF201
Q205 2SC3400
TP212
AFC
VXO
ACC AMP
ACC DET
PB fH/8 PULSE GENERATOR
HALF H PULSE KILLER
REC AFC PHASE DET
4 PHASE ROTATOR
INVER-TER
SUB CONV
COLOR DET
REC APC PHASE DET
PB APC PHASE DET
PB MAIN CONV
PB BURST DEEMPHA KILLER AMP
REC BURST EMPHA MAIN CONV KILLER AMP
Q221 2SC2785HF,FF,EF
IC4 AN6327
SYNC SEP
SUB LIMITER
LIMITER
DE-MOD
E-E AMP
MUTE AMP
Q10 2SA1175
IC5 5VT09
IC6 AN6393
MIX
LIM-TER
AGC AMP
AGC DET
DOC DET
OUT AMP
Q12 2SC2785 HF,FF,EF
Q13 2SC2785 HF,FF,EF
Q14 2SA1175
EQ
PB FM(TP)
Q227 2SC3400
Q225 2SB643R,S
Q211 2SC2785 HF,FF,EF
Q209 2SC2785HF,FF,EF
Q210 2SC2785HF,FF,EF
LPF202
EQ201
TP204
CONV. BALANCE
Q219 2SC3400
IC202 BA7007
Q220 2SC2785HF,FF,EF
COMP1
COMP2
DET
TP223
Q214 2SA1346
PB FM
VIDEO PB(H)
V PULSE ON(H)
PB COLOR / V PULSE
SYNC
LOAD/AL 5V
REC MUTE(H)
PB 5V
VIDEO REC(H)
PB(H)
INSERT(H)
D FF
CP401 ICP-F20
Q401 2SA1282AF
IC401-1/2
Q402 2SA1282AF
IC402
REG 5V
+5V 1
+5V 2
Q403 2SA1282AF
IC401-1/2
IC401 AN6913 or TA75393S
IC402 M5236L
RL301
PUS 6400-2
Q301 2SC1545AB
Q302 2SC1545AB
Q37 2SC2785 HF,FF,EF
Q38 2SC2785FF
Q15 2SA1175
Q16 2SC2785 HF,FF,EF
Q17 2SC3400
Q39 2SA1175FF
Q19 2SA1175
TP10 VIDEO OUT
Q20 2SC2785HF, FF, EF
Q21 2SC2785 HF,FF,EF
Q22 2SA1175
LPF1
IC7 AN6306
E-E LEVEL
W CLIP
PB AMP
AGC AMP
AGC DET
PULSE DELAY
F-MOD
MAIN EMPHA
W/D CLIP
TP23 CARR DEV (FM OUT)
TP3
D CLIP
CARRIER DEVIATION
Q23 2SA1175
Q24 2SA1175
Q25 2SC2785HF,FF,EF
REC FM
Q26 2SC3400
Q27 2SC2785HF,FF,EF
Q28 2SC2785HF,FF,EF
Q30 2SB643RS
Q31 2SB643RS
Q33 2SB851Q,R
Q32 2SC2785HF,FF,EF
Q34 2SC3400
IC8 AN6392
MUTE CTL
EQ AMP
CURRENT AMP
Q29 2SC3400
REC FM TP4
AUDIO FOR RF
SWD 5V
SWD 9V
EE & REC 5V
A
B
C
D
E
G
H
1
2
3
4
5
6

NOTES: Unless otherwise specified;
All diodes are 1SS133.
All capacitors are in microfarads, inductors are in henries, resistors are in ohms (1/6 W).
(   ) represents the DC voltage at playback mode.
Shaded (■) parts are critical for safety. Replace only with specified part numbers.


CONNECT THE TUNER UNIT
MULTI CONNECTOR
IC2 TL8704P
IH DELAY
CLOCK
Q6 2SC2785HF,FF,EF
Q7 2SC2787LF
Q8 2SB881Q,R
Q9 2SC3400
Q13 2SC2785 HF,FF,EF
Q14 2SA1175
Q201 2SC2785HF,FF,EF
Q202 2SC2785HF,FF,EF
Q203 2SC2785HF,FF,EF
IC 201 HA11756
REC COLOR
DL 201
CONV. BALANCE TP 201
VXO TP203
AFC
TP 212
OSC BLOCK
REC BURST EMPHA MAIN CONV KILLER AMP
ACC AMP
ACC DET
PB Sync/B PULSE GENERATOR
HALF H PULSE KILLER
REC AFC PHASE DET
COUN-TER
PB REC
2fH/4fH DET
4 PHASE ROTATOR
INVER-TER
SUB CONV
GATE
BURST GATE PULSE GENERATOR
COLOR DET
REC APC PHASE DET
PB APC PHASE DET
PB MAIN CONV
PB BURST DEEMPHA KILLER AMP
REC/PB DET
160fH VCO
X-TAL OSC
Q204 2SC2785HF,FF,EF
Q205 2SC3400
Q207 2SC2785 HF,FF,EF
Q215: 2SC3400
Q218: 2SC3400
Q216: 2SC2787LF
Q217: 2SC2785HF,FF,EF
D FF
SECAM L
SECAM H
LOAD/AL 5V
VIDEO PB(H)
V PULSE ON(H)
PB COLOR / V PULSE
SYNC
SWD 9V
PB 5V
Q223 2SC3400
Q224 2SC3400
Q303 2SA881Q,R
IC 202 BA7007
Q220 2SC2785HF,FF,EF
Q225 2SB643R,S
Q227 2SC3400
Q211 2SC2785 HF,FF,EF
P/B COLOR LEVEL
COMP1
COMP2
DET
LIM-ITER
TP223
TP204
TP221
SWD 5V
Q208 2SB643RS
S DET
Q226 2SA1346
Q212 2SC2785HF,FF,EF
Q222 2SC2785HF,FF,EF
Q214 2SA1346
PB BURST
P/B COLOR
Q213 2SC2785HF,FF,EF
Q209 2SC2785HF,FF,EF
Q210 2SC2785HF,FF,EF
Q219 2SC3400
CONV. BALANCE
LPF202
EQ201
PB FM(TP)
PB FM
REC MUT(H)
VIDEO REC(H)
PB(H)
INSERT(H)
F1 2.5A
CN11
BATT/CHARGE
PWR ON CTL
VIDEO OUT
VIDEO GND
VIDEO IN
HEATER 12V
AUDIO IN
AUDIO GND
CN12
CH LOCK(H)
TIMER REC(L)
TIMER SW(L)
REMOTE KEY
AUDIO GND
AUDIO OUT
CAMERA & PB(L)
CN9
GND
CAP MOTOR DRIVE
MOTOR GND
V PULSE
HEATER 12V
PB FM (TP)
SYNC
BATTERY GND
D
C
from/to 03 SERVO PWB CN2
CN1
CAPSTAN FG
E
SERVO MODE(H)
F
REVERSE(H)
DRUM PHASE CTL(H)
DRUM MOTOR STOP(L)
CAP PHASE CTL(H)
from/to 01 MECHACON PWB CN1
CN8
SLOW / STILL(L)
SERVO MODE(H)
DRUM PHASE CTL(H)
CAP PHASE CTL(H)
V PULSE ON(H)
SWITCHED 5V
CAP SERVO ERROR
VIDEO SQUELCH(H)
DRUM FF
SWITCHED 12V
BATTERY 12V
CTL PULSE
BATTERY 12V
from/to 03 SERVO PWB CN1
CN6
REC FM
PB FM
PB 5V
DRUM FF
REC 9V
IC1 HA11782
CH BALANCE
AMP
PRE AMP
SW
GAIN ADJ
DRUM FF
Q1 2SC2712Y
Q2 2SC2712Y
Q3 2SC2712Y
Q4 2SC2712Y
TP1
TP2
VIDEO HEADS
RT
GRY or PNK
CH1
BRN
RED
CH2
WHT
06 PRE AMP
Q20 2SC2785HF,FF,EF
Q21 2SC2785 HF,FF,EF
Q22 2SA1175
E-E LEVEL
IC7 AN6306
W CLIP
PB AMP
AGC AMP
AGC DET
PULSE DELAY
F-MOD
CLAMP
MAIN EMPHA
W/D CLIP
TP23 CARR DEV (FM OUT)
TP3 W/D CLIP
D CLIP
CARRIER DEVIATION
Q23 2SA1175
Q24 2SA1175
Q25 2SC2785HF,FF,EF
Q26 2SC3400
Q27 2SC2785HF,FF,EF
Q28 2SC2785HF,FF,EF
REC FM
SWD 5V
SWD 12V
12V
REC 9V
SWD 9V
Q30 2SB643RS
Q31 2SB643RS
Q32 2SC2785HF,FF,EF
Q33 2SB881Q,R
Q34 2SC3400
Q36 2SD1055PQ
IC8 AN6392
MUTE CTL
EQ AMP
CURRENT AMP
Q29 2SC3400
REC FM TP 4
CN7
END SENS
VIDEO
F.E.ON (H)
SW 9V
REC 9V
GND
AUDIO
09 OSC
Q2 DTC144F
Q1 DTA124F
IC1 3VT01
34Vp-p 60KHz
TP2
TP1
BIAS OSC
10 RF CONV.
RF CONV.
VIDEO IN
GND
5V
AUDIO
RF OUT
to shield plate of MULTI CONNECTOR
to shield plate of PRE AMP board
13 F.E HEAD
FULL ERASE HEAD
19 END SENS.

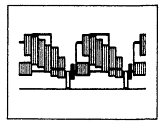

CONNECT THE TUNER UNIT
CN11
S101
NO
NC
⑱ BATT/CHARGE
⑮ PWR ON CTL
⑲ VIDEO OUT
⑫ VIDEO GND
⑰ VIDEO IN
⑦ HEATER 12V
⑭ AUDIO IN
⑧ AUDIO GND
④ VIDEO GND
CN12
⑯ CH LOCK(H)
⑥ TIMER REC(L)
⑪ TIMER SW(L)
⑬ REMOTE KEY
③ AUDIO GND
① AUDIO OUT
⑤ CAMERA & PB(L)
MULTI CONNECTOR

NOTES: Unless otherwise specified;
All diodes are 1SS133.
All capacitors are in microfarads, inductors are in henries, resistors are in ohms (1/6 W).
(   ) represents the DC voltage at playback mode.
Shaded (▇) parts are critical for safety. Replace only with specified part numbers.


CN9
GND
CAP. MOTOR DRIVE
MOTOR GND
V. PULSE
HEATER 12V
PB FM (TP)
SYNC
BATTERY GND
D
BATTERY GND
C
from/to
03
SERVO PWB CN2
CN1
C
D
CAPSTAN FG
E
SERVO MODE (H)
F
REVERSE (H)
DRUM PHASE CTL (H)
DRUM MOTOR STOP (L)
CAP. PHASE CTL (H)
from/to
01
MECHACON PWB CN1
CN8
SLOW / STILL (L)
SERVO MODE (H)
DRUM PHASE CTL (H)
E
F
CAPSTAN FG
DRUM MOTOR STOP (L)
CAP PHASE CTL (H)
GND
V PULSE ON (H)
SWITCHED 5V
REVERSE (H)
CAP. SERVO ERROR
VIDEO SQUELCH (H)
DRUM FF
SWITCHED 12V
BATTERY 12V
CTL PULSE
BATTERY 12V
from/to
03
SERVO PWB CN1
F1 2.5A
CN6
GND
GND
REC FM
PB FM
PB 5V
DRUM FF
REC 9V
⑤
CN1
IC1 HA11782
GND
CH BALANCE
Vcc
SW
AMP
PRE AMP
GAIN ADJ
DRUM FF
C4 47/6.3
C6 0.022
C5 0.022
L2 100μ
C1 0.022
R17 33K
L1 100μ
C2 47/6.3
C3 0.022
C11 0.022
C9 0.022
C7 0.022
R7 680
R1 6.8K
R3 10K
R5 12K
C13 50P
C14 50P
R6 12K
C15 0.022
C17 0.022
C18 0.022
C16 0.022
R10 2.7K
R9 2.7K
C12 0.022
R8 680
C10 0.022
R4 10K
R2 6.8K
C8 0.022
Q1 2SC2712Y
Q2 2SC2712Y
Q3 2SC2712Y
Q4 2SC2712Y
R11 1.5K
R12 1.5K
C19 0.022
C20 0.022
R13 39
R14 39
R15 3.9
R16 3.9
C21 1/50
C22 1/50
TP1
TP2
VIDEO HEADS
RT
GRY or PNK
BRN
RED
WHT
CH1
CH2
06 PRE AMP
09 OSC
CN7
END SENS
VIDEO
F.E ON (H)
SW 9V
REC 9V
GND
AUDIO
R2 390
Q2 DTC144F
Q1 DTA124F
IC1 3VT01
L1 470μ
R1 39K
34Vp-p 60KHz
TP2
TP1
15
C2 0.039
BIAS OSC
C1 22/25
CN3
CN5
CN2
CN4
10 RF CONV.
L1 100μ
C1 0.01
RF CONV.
VIDEO IN
GND
9V
AUDIO
RF OUT
to shield plate of MULTI CONNECTOR
C2 100P
to shield plate of PRE-AMP board
13 F.E HEAD
FULL ERASE HEAD
19 END SENS.
C1 0.047

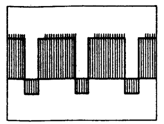
— Main waveforms of video circuit —

1



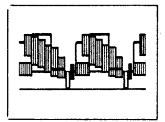
TP1
VIDEO IN
2 Vp-p (P/B)

2



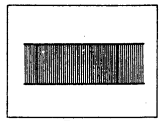
Pin ⑫ of IC4
DEMOD. OUT
0.4 Vp-p (P/B)

3



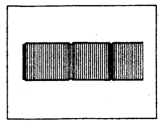
Pin ㉒ of IC4
SYNC IN
1.0 Vp-p (P/B)

4



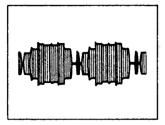
Pin ① of IC4
SYNC OUT
4.0 Vp-p (P/B)

5



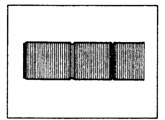
CN-6 ⑥ Pin
P/B FM IN
0.5 Vp-p (P/B)

6



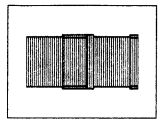
TP204
P/B COLOR
0.25 Vp-p
(P/B)

7



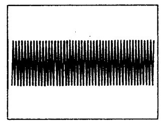
Pin ⑤ of IC6
P/B FM
4.5 Vp-p (P/B)

8



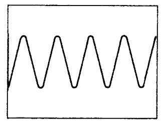
Pin ⑤ of IC4
LIMIT IN
2.2 Vp-p (P/B)

9



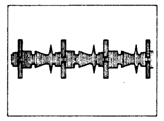
TP225
VXO
0.1Vp-p (P/B)

10



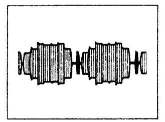
TP212
AFC
0.8 Vp-p (P/B)

11



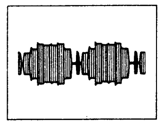
TP201
CONV. BAL
0.24 Vp-p
(P/B)

12



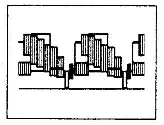
Pin ① of IC201
CONV. COLOR
0.15 Vp-p
(P/B)

13



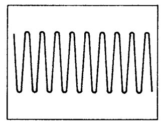
Pin ⑰ of IC4
MIX COLOR
0.24 Vp-p
(P/B)

14



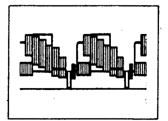
TP10
VIDEO OUT
2.0 Vp-p
(P/B)

15



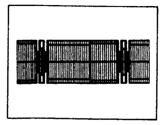
TP1
OSC
34 Vp-p
(REC)

16



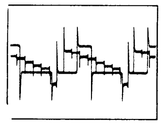
Pin ⑱ of IC7
AGC OUT
1.2 Vp-p
(REC)

17



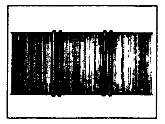
TP4
REC FM
4.2 Vp-p
(REC)

18



TP3
W/D CLIP
0.8 Vp-p
(REC)

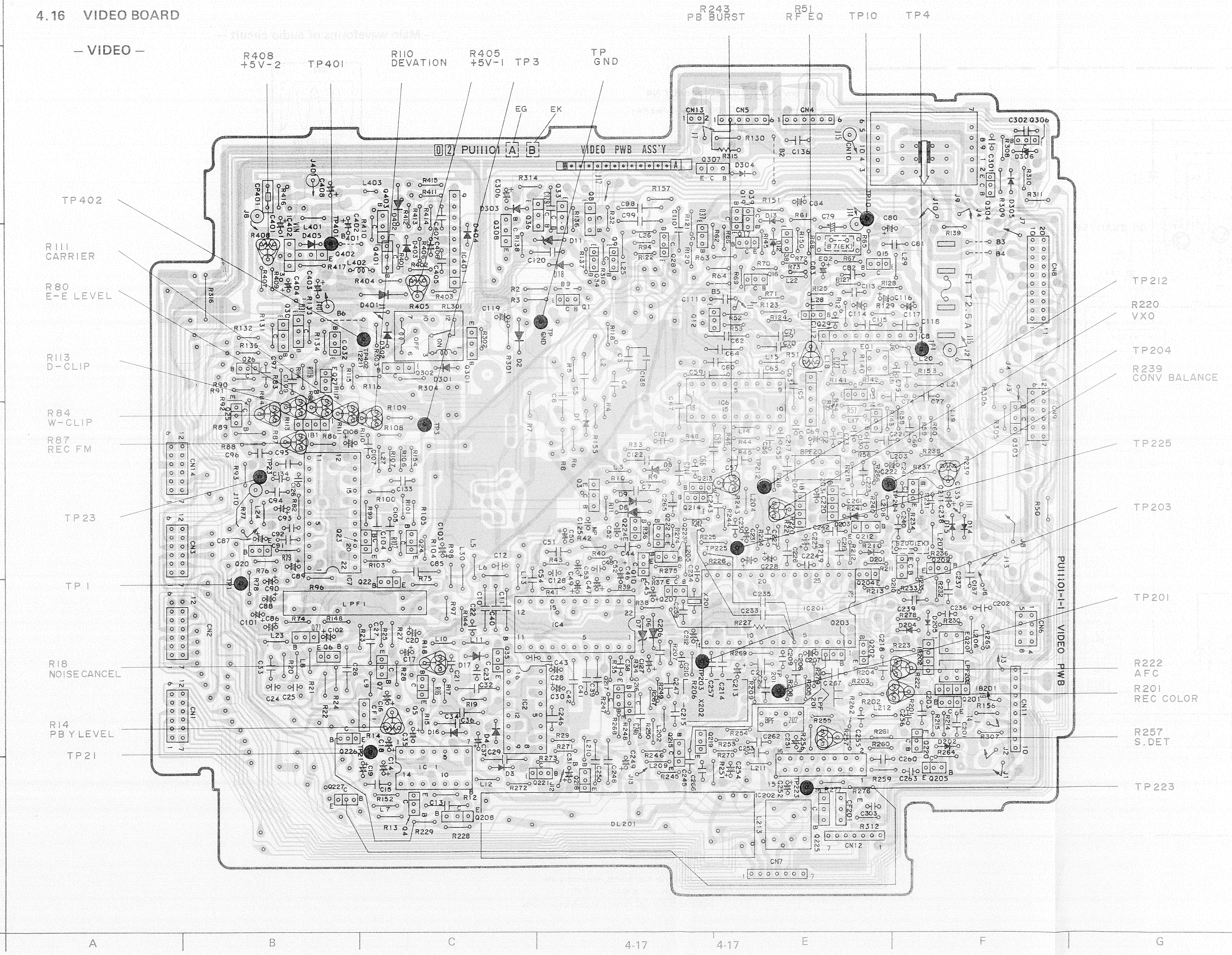
19

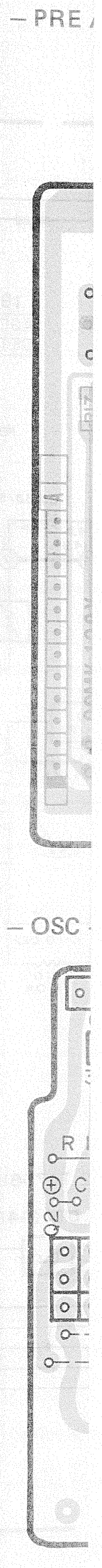


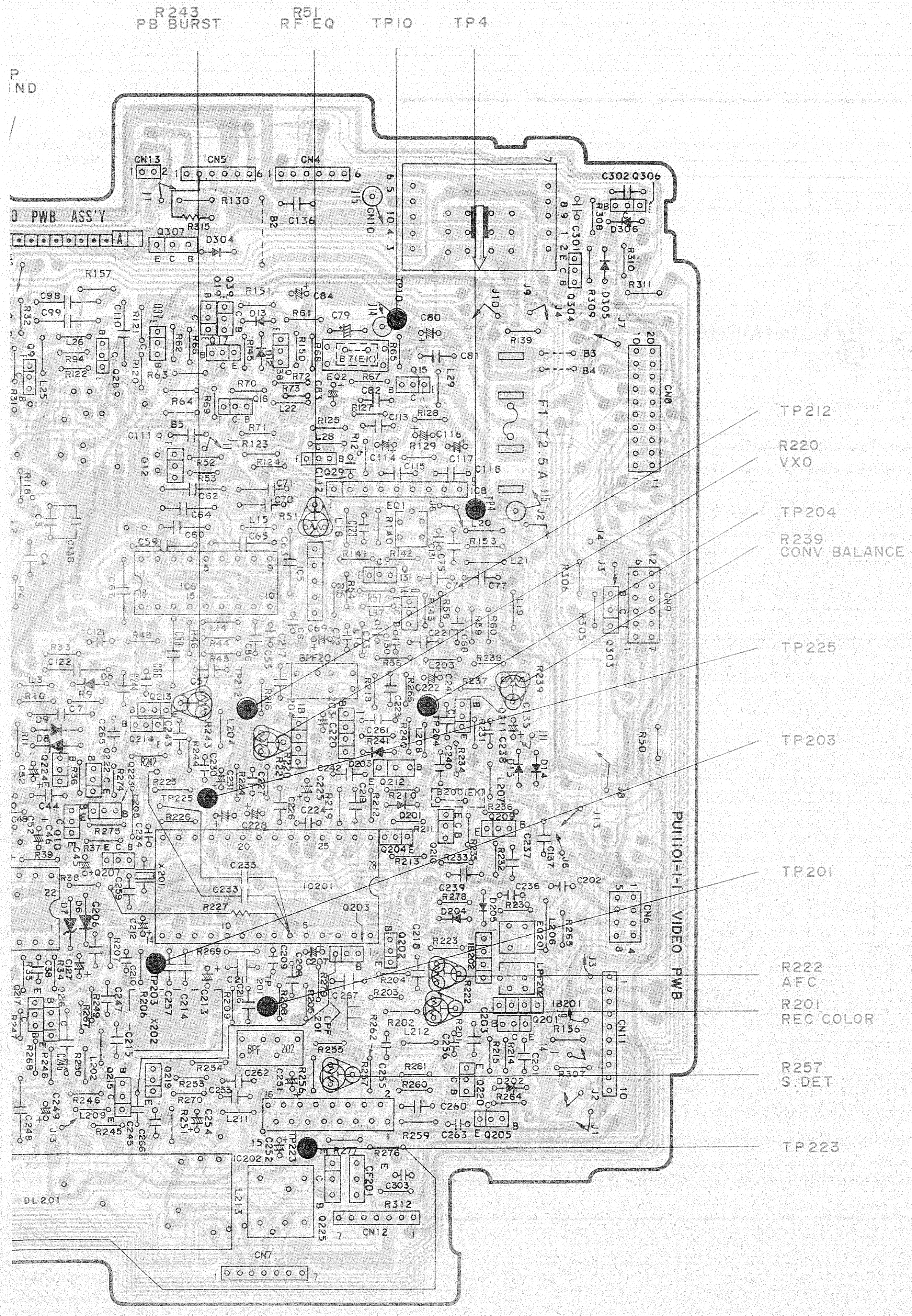
TP23
CARR. DIV
1.0 Vp-p
(REC)

4.16 VIDEO BOARD

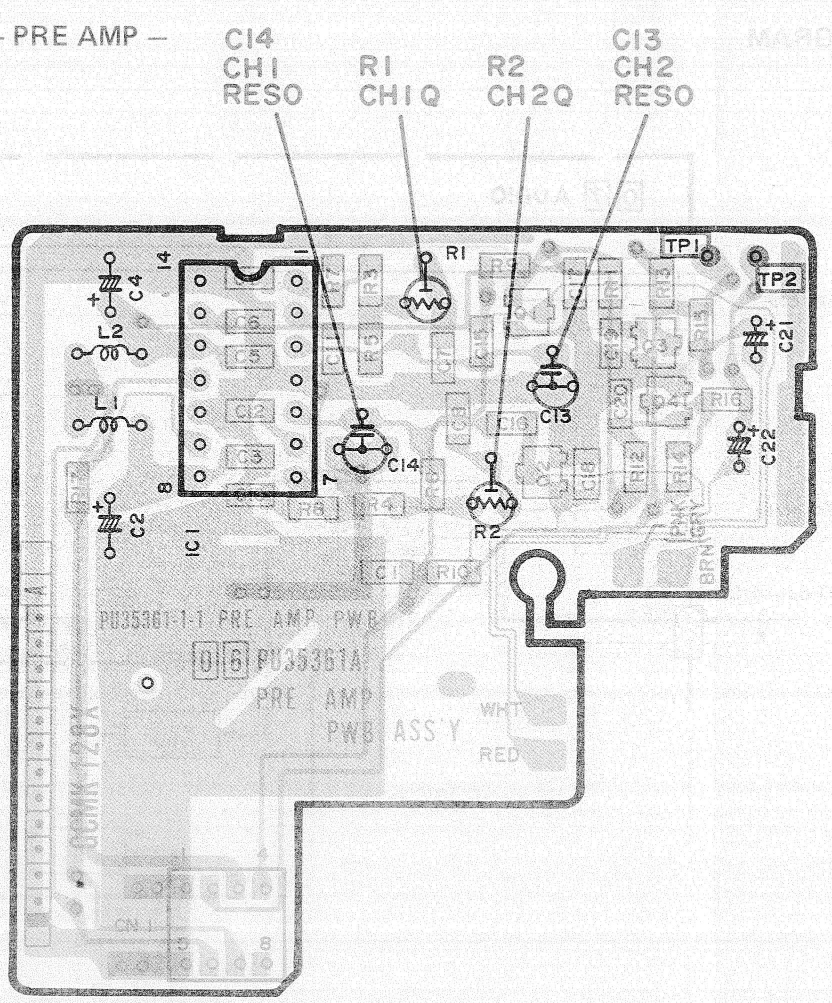
– VIDEO –


R408
+5V-2
TP401
R110
DEVATION
R405
+5V-1
TP3
TP
GND
R243
PB BURST
R51
RF EQ
TP10
TP4
EG
EK
02 PU11101 A B
VIDEO PWB ASS'Y
TP402
R111
CARRIER
R80
E-E LEVEL
R113
D-CLIP
R84
W-CLIP
R87
REC FM
TP23
TP1
R18
NOISE CANCEL
R14
PB Y LEVEL
TP21
TP212
R220
VXO
TP204
R239
CONV BALANCE
TP225
TP203
TP201
R222
AFC
R201
REC COLOR
R257
S.DET
TP223
PU11101-1-1 VIDEO PWB
IC1
IC2
IC4
IC6
IC7
IC201
IC202
IC401
LPF1
DL201
CN1
CN2
CN3
CN4
CN5
CN6
CN7
CN8
CN9
CN10
CN11
CN12
CN13
CN14
1
2
3
4
5
6
A
B
C
D
E
F
G
H

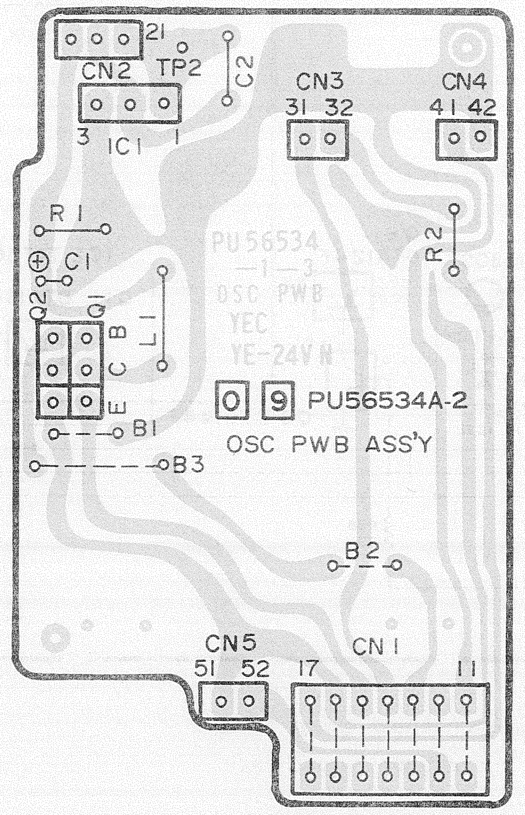



R243
PB BURST
R51
RF EQ
TP10
TP4
TP212
R220
VXO
TP204
R239
CONV BALANCE
TP225
TP203
TP201
R222
AFC
R201
REC COLOR
R257
S.DET
TP223
PWB ASS'Y
PU11101-1-1 VIDEO PWB
F1 T2.5A
DL201

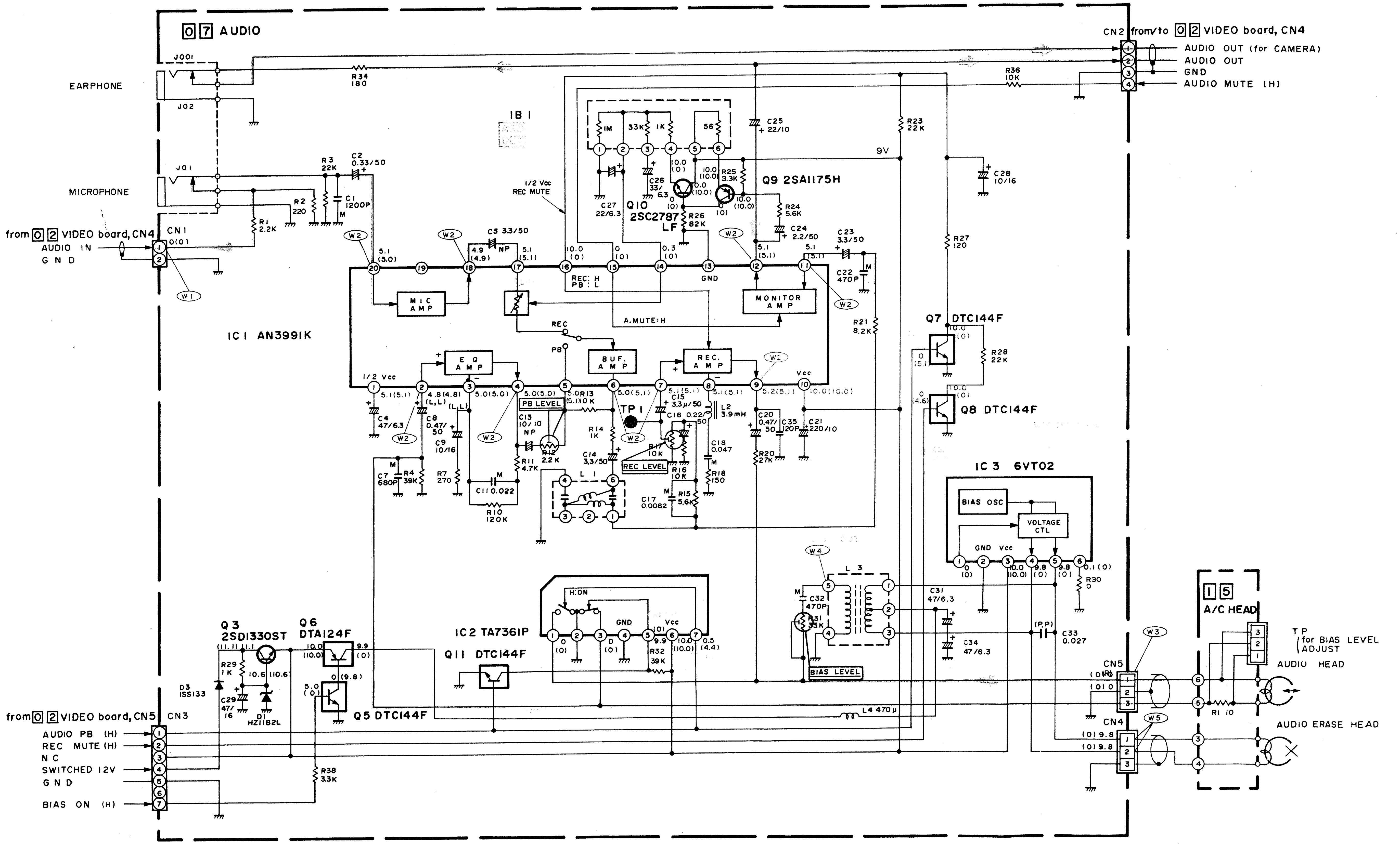
– PRE AMP –


C14
CH1
RESO
R1
CH1Q
R2
CH2Q
C13
CH2
RESO
TP1
TP2
IC1
PU35361-1-1 PRE AMP PWB
06 PU35361A
PRE AMP
PWB ASS'Y
WHT
RED
PNK
GRY
BRN
CN1

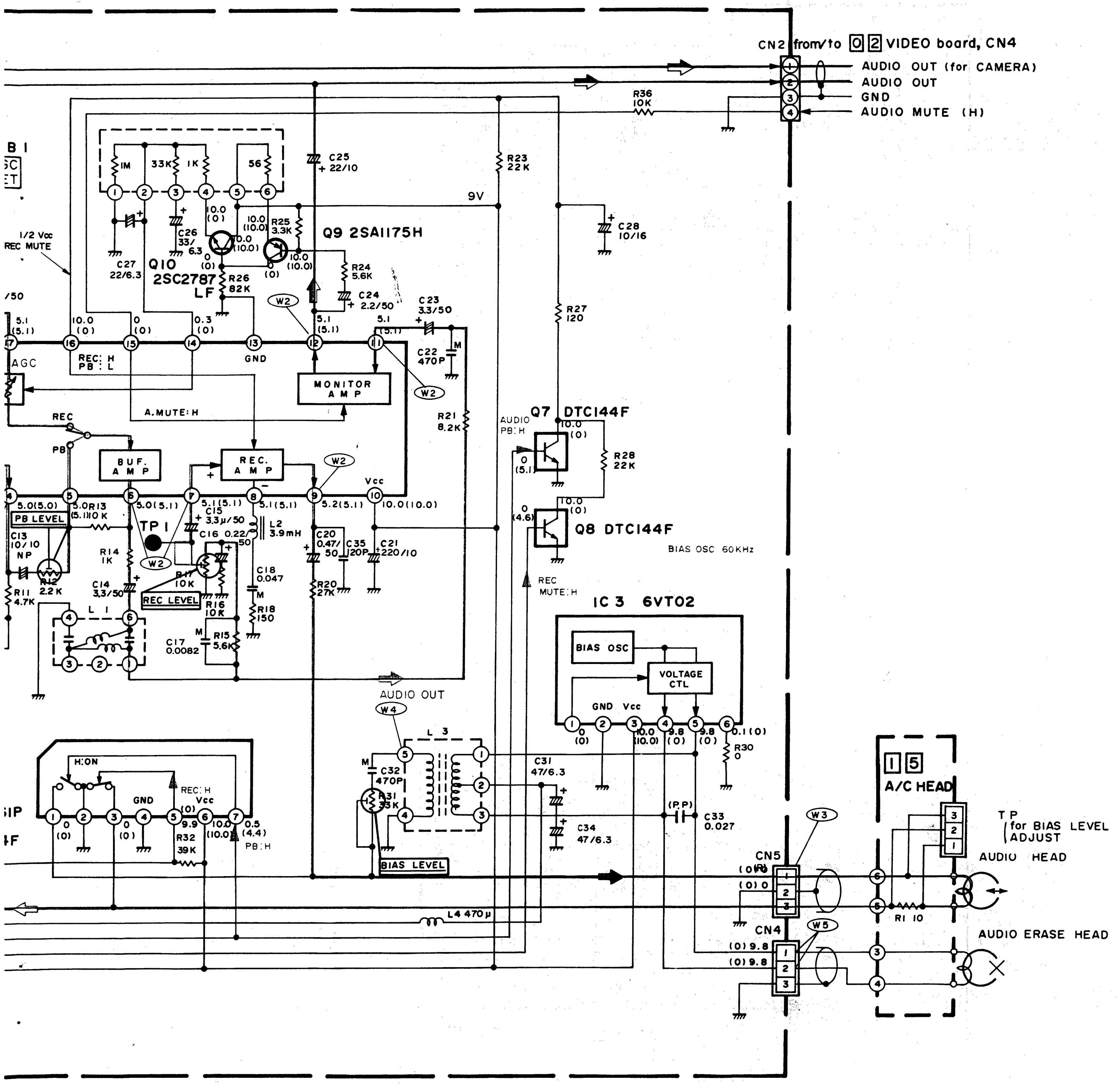
– OSC –


CN2
TP2
C2
CN3
31 32
CN4
41 42
IC1
R1
C1
R2
Q2
Q1
L1
E C B
PU56534
-1-3
OSC PWB
YEC
YE-24VH
0 9 PU56534A-2
OSC PWB ASS'Y
B1
B3
B2
CN5
51 52
CN1
17
11

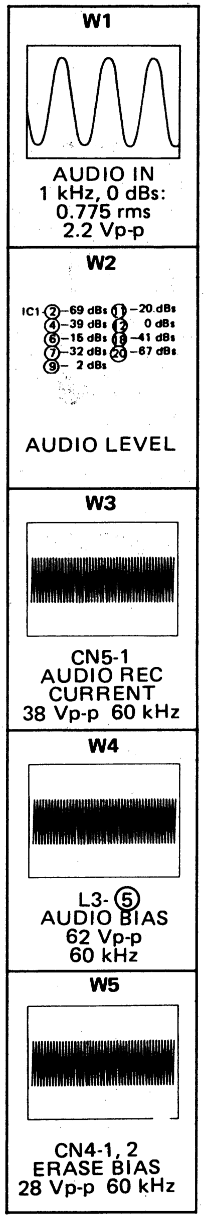
4.17 AUDIO SCHEMATIC DIAGRAM


07 AUDIO
EARPHONE
J001
J02
MICROPHONE
J01
from 02 VIDEO board, CN4
CN1
AUDIO IN
GND
R34 180
R3 22K
C2 0.33/50
R2 220
C1 1200P
R1 2.2K
C3 3.3/50 NP
IB1
1/2 Vcc REC MUTE
IC1 AN3991K
MIC AMP
EQ AMP
BUF. AMP
REC. AMP
MONITOR AMP
REC: H PB: L
A.MUTE: H
REC
PB
GND
Vcc
1/2 Vcc
PB LEVEL
REC LEVEL
TP1
Q10 2SC2787 LF
Q9 2SA1175H
C25 22/10
R23 22K
9V
C28 10/16
R27 120
C23 3.3/50
C22 470P
R21 8.2K
Q7 DTC144F
R28 22K
Q8 DTC144F
L2 3.9mH
C15 3.3μ/50
C16 0.22/50
C18 0.047
R18 150
C20 0.47/50
C35 120P
C21 220/10
R20 27K
C4 47/6.3
C8 0.47/50
C9 10/16
R7 270
C7 680P
R4 39K
C11 0.022
R10 120K
R11 4.7K
R12 2.2K
C13 10/10 NP
R13 10K
R14 1K
C14 3.3/50
L1
C17 0.0082
R15 5.6K
R16 10K
R17 10K
IC3 6VT02
BIAS OSC
VOLTAGE CTL
L3
C31 47/6.3
C32 470P
R31 33K
BIAS LEVEL
C34 47/6.3
C33 0.027
R30 0
IC2 TA7361P
H:ON
Q11 DTC144F
R32 39K
L4 470μ
Q3 2SD1330ST
Q6 DTA124F
Q5 DTC144F
R29 1K
C29 47/16
D1 HZ11B2L
D3 1SS133
R38 3.3K
from 02 VIDEO board, CN5
CN3
AUDIO PB (H)
REC MUTE (H)
NC
SWITCHED 12V
GND
BIAS ON (H)
CN2 from/to 02 VIDEO board, CN4
AUDIO OUT (for CAMERA)
AUDIO OUT
GND
AUDIO MUTE (H)
R36 10K
15 A/C HEAD
TP (for BIAS LEVEL ADJUST)
AUDIO HEAD
AUDIO ERASE HEAD
R1 10
CN5
CN4
W1
W2
W3
W4
W5
RECORDING SIGNAL PATH
PLAYBACK SIGNAL PATH
REC/PLAY SIGNAL PATH
A
B
C
D
E
F
G
1
2
3
4
5
6

NOTES: Unless otherwise specified;
All diodes are 1SS133.
All capacitors are in microfards, inductor
in henries, resistors are in ohms (1/6 W).
( ) represents the DC voltage at playb

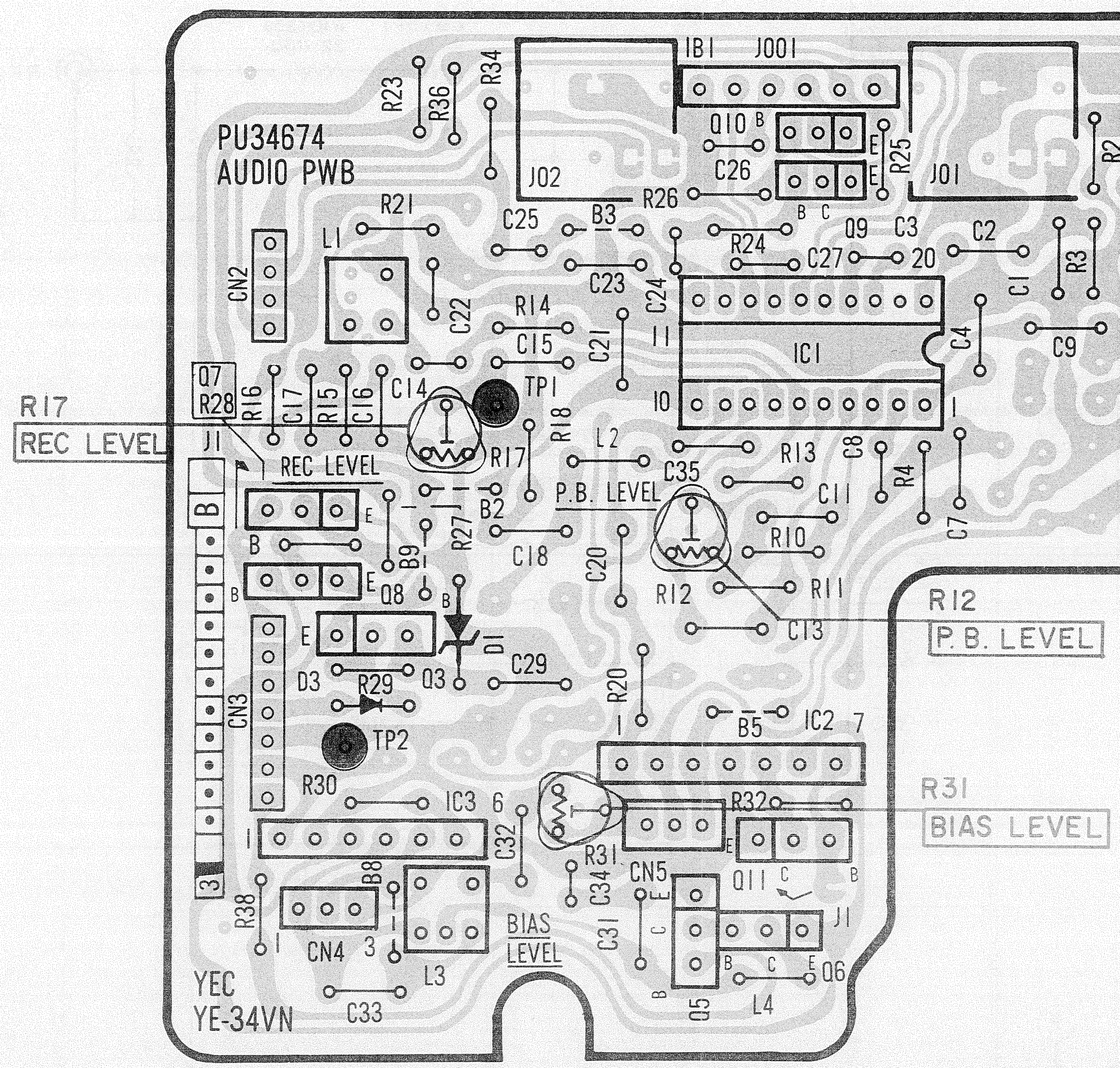

CN2 from/to 02 VIDEO board, CN4
AUDIO OUT (for CAMERA)
AUDIO OUT
GND
AUDIO MUTE (H)
R36 10K
C25 22/10
R23 22K
9V
C28 10/16
Q9 2SA1175H
Q10 2SC2787 LF
R25 3.3K
R24 5.6K
R26 82K
C26 33/6.3
C27 22/6.3
C24 2.2/50
C23 3.3/50
C22 470P
1/2 Vcc
REC MUTE
AGC
REC: H PB: L
GND
MONITOR AMP
A.MUTE: H
REC
PB
BUF. AMP
REC. AMP
Vcc
PB LEVEL
REC LEVEL
TP1
R13 10K
R14 1K
R11 4.7K
R12 2.2K
C13 10/10 NP
C14 3.3/50
R17 10K
R16 10K
R15 5.6K
C15 3.3μ/50
C16 0.22/50
L2 3.9mH
C17 0.0082
C18 0.047
R18 150
C20 0.47/50
C35 120P
C21 220/10
R20 27K
R21 8.2K
R27 120
R28 22K
AUDIO PB: H
Q7 DTC144F
Q8 DTC144F
BIAS OSC 60KHz
REC MUTE: H
IC3 6VT02
BIAS OSC
VOLTAGE CTL
GND Vcc
R30 0
AUDIO OUT
L3
C32 470P
R31 33K
BIAS LEVEL
C31 47/6.3
C34 47/6.3
C33 0.027
H: ON
REC: H
PB: H
R32 39K
L4 470μ
CN5
CN4
15 A/C HEAD
TP for BIAS LEVEL ADJUST
AUDIO HEAD
R1 10
AUDIO ERASE HEAD

— Main waveforms of audio circuit —



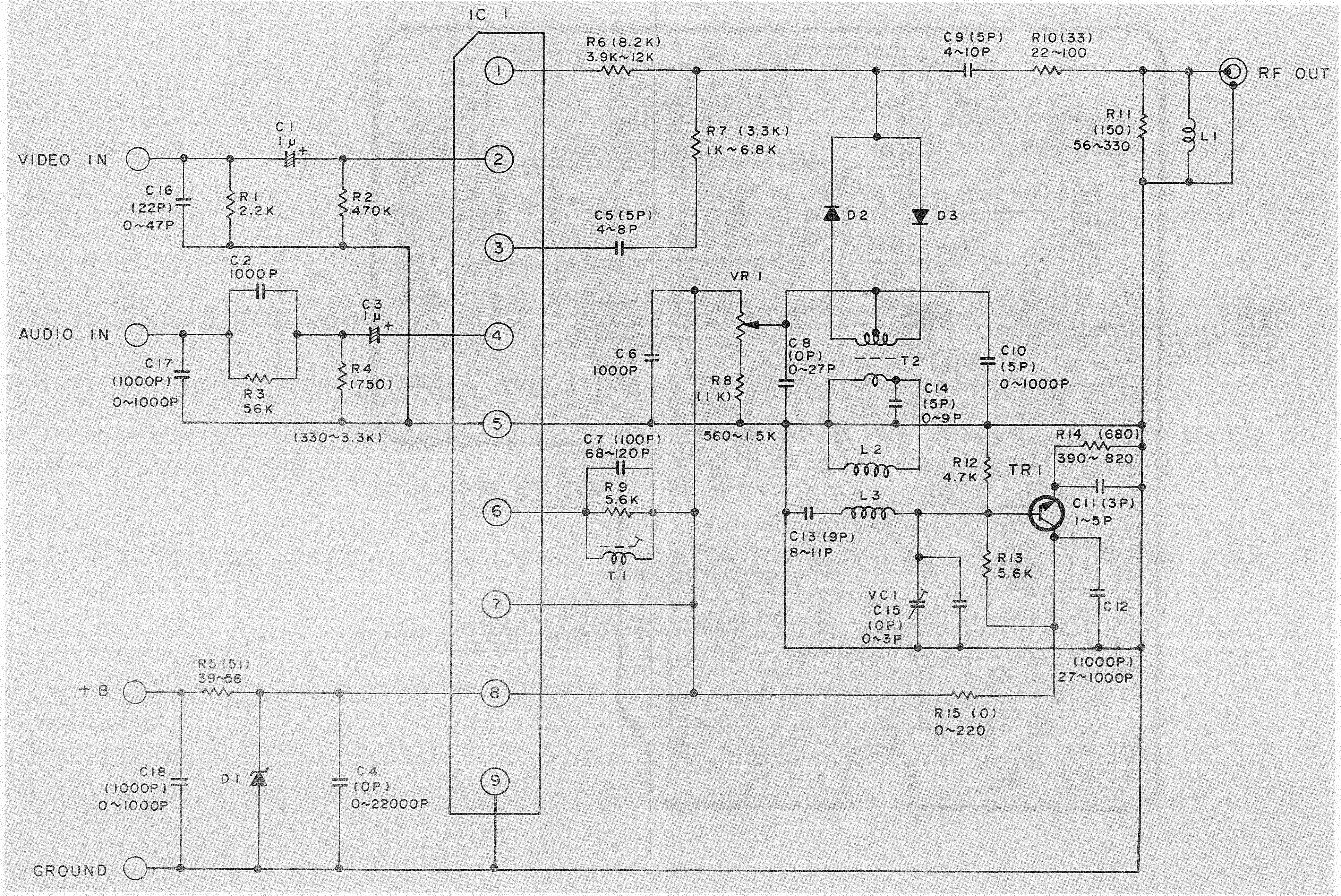
NOTES: Unless otherwise specified;
All diodes are 1SS133.
All capacitors are in microfards, inductors are in henries, resistors are in ohms (1/6 W).
(   ) represents the DC voltage at playback mode.

4.18 AUDIO BOARD



PU34674
AUDIO PWB
YEC
YE-34VN
R17
REC LEVEL
R12
P.B. LEVEL
R31
BIAS LEVEL
IB1
J001
J01
J02
J1
Q10
Q9
Q8
Q7
Q3
Q11
Q5
Q6
IC1
IC2
IC3
CN2
CN3
CN4
CN5
L1
L2
L3
L4
TP1
TP2
D1
D3
B2
B3
B5
B8
B9
R1
R2
R3
R4
R7
R10
R11
R13
R14
R15
R16
R18
R20
R21
R23
R24
R25
R26
R27
R28
R29
R30
R32
R34
R36
R38
C1
C2
C3
C4
C7
C8
C9
C11
C13
C14
C15
C16
C17
C18
C20
C21
C22
C23
C24
C25
C26
C27
C28
C29
C31
C32
C33
C34
C35
REC LEVEL
P.B. LEVEL
BIAS
LEVEL

4.19 RF CONV. SCHEMATIC DIAGRAM


IC 1
VIDEO IN
AUDIO IN
+B
GROUND
RF OUT
C1 1μ
C16 (22P) 0~47P
R1 2.2K
R2 470K
C2 1000P
C3 1μ
C17 (1000P) 0~1000P
R3 56K
R4 (750)
(330~3.3K)
R5 (51) 39~56
C18 (1000P) 0~1000P
D1
C4 (0P) 0~22000P
R6 (8.2K) 3.9K~12K
R7 (3.3K) 1K~6.8K
C5 (5P) 4~8P
C6 1000P
VR 1
R8 (1K)
560~1.5K
C7 (100P) 68~120P
R9 5.6K
T1
C8 (0P) 0~27P
D2
D3
T2
C14 (5P) 0~9P
L2
L3
C13 (9P) 8~11P
VC1 C15 (0P) 0~3P
C9 (5P) 4~10P
R10 (33) 22~100
R11 (150) 56~330
L1
C10 (5P) 0~1000P
R12 4.7K
TR1
R13 5.6K
R14 (680) 390~820
C11 (3P) 1~5P
C12
(1000P) 27~1000P
R15 (0) 0~220
1
2
3
4
5
6
7
8
9

SECTION 5
ELECTRICAL PARTS LIST

SAFETY PRECAUTION

Parts identified by the ⚠ symbol are critical for safety. Replace only with specified part numbers.

ABBREVIATIONS IN THIS LIST ARE AS FOLLOWS:

RESISTORS – All resistance values are in ohms (Ω).

K	1 000
M	1 000 000
CR	Carbon Resistor
Comp. R	Composition Resistor
WR	Wire Wound Resistor
OMR	Oxide Metal Film Resistor
VR	Variable Resistor (Potentiometer)
MFR	Metal Film Resistor
FR	Fusible Resistor
PMR	Precision Metal Film Resistor

CAPACITORS – All capacitance values are in μF, unless otherwise indicated.

P	μμF
C Cap	Ceramic Capacitor
E Cap	Electrolytic Capacitor
FM Cap	Film Mica Capacitor
MM Cap	Metalized Mylar Capacitor
MP Cap	Metalized Paper Capacitor
MY Cap	Mylar Capacitor
NP Cap	Non-polar Capacitor
PC Cap	Polycarbonate Capacitor
PP Cap	Poly Pro Capacitor
PS Cap	Polystyrol Capacitor
T Cap	Tantalum Capacitor
TR Cap	Trimmer Capacitor
LL Cap	Low Leak Current Electrolytic Capacitor
TF Cap	Thin Film Capacitor

5.1 ELECTRICAL PARTS LIST

5.1.1 Bottom board ass'y $\boxed{0}\boxed{1}$ PU11077A1

Symbol No.	Part No.	Part Name	Description
IC 1	–	–	
IC 2	BQ-050	Integrated Circuit	CHG CTL
⚠IC51	MB8854M-469L	Integrated Circuit	
IC52	MN1219	"	
IC53	LM339N	"	
IC54	TL066CP	"	
⚠Q 1	2SA1020Y	Transistor	
⚠Q 2	2SC2562O	"	
Q 3	–	–	
Q 4	–	–	
Q 5	–	–	
Q 6	–	–	
Q 7	2SD637R,S	Transistor	
Q 8	–	–	
⚠Q 9	2SD637R,S	Transistor	
⚠Q10	2SD880Y	"	
Q11	2SD637R,S	"	
⚠Q12	2SD822P,Q	"	
⚠Q13	2SB744P,Q	"	
Q14	2SD637R,S	"	
Q15	2SC3070	"	
Q51	–	–	
Q52	–	–	
Q53	DTC144WF	D. Transistor	
Q54	DTC144F	"	
Q55	–	–	
Q56	N13T1	PUT	
Q57	DTA144WF	D. Transistor	
Q58	–	–	
Q59	DTA144WF	D. Transistor	
Q60	DTC144WF	"	
Q61	DTA124F	"	EK
⚠D 1	30D2FC	Diode	
⚠D 2	"	"	
⚠D 3	"	"	
⚠D 4	"	"	
⚠D 5	31DQ04FC	"	
D 6	–	–	
D 7	–	–	
D 8	–	–	
D 9	30D2FC	Diode	
D10	11E2	"	
⚠D11	10E2FA5	"	
⚠D12	"	"	
⚠D13	"	"	
⚠D14	"	"	
D15	HZ7A-2	Zener Diode	
D16	HZ6B-2	"	
⚠D17	11E2	Diode	
⚠D18	"	"	
D19	HZ15-2	Zener Diode	
D20	"	"	

Symbol No.	Part No.	Part Name	Description
D21	1SS133	Diode	
D22	MA150	"	
D51	LTZ-R15	Diode	
D52	MA150	"	
D53	1SS133	"	
D54	–	–	
D55	MA150	Diode	
D56	"	"	
D57	1SS133	"	
D58	MA150	"	
R 1	QRD187J-331	CR	330 1/8 W
⚠R 2	QRZ0052-221	FR	220
R 3	QRD121J-222	CR	2.2 K 1/2 W
⚠R 4	PU57337	Posistor	
R 5	–	–	
⚠R 6	QRZ0052-100	FR	10
R 7	–	–	
R 8	–	–	
R 9	–	–	
R10	–	–	
R11	–	–	
R12	–	–	
R13	–	–	
R14	–	–	
R15	–	–	
R16	–	–	
⚠R17	QRM015K-R10	MPR	0.1 1 W
R18	–	–	
R19	–	–	
R20	–	–	
R21	QRD161J-102	CR	1 K 1/6 W
R22	" -103	"	10 K "
R23	QRD121J-222	"	2.2 K 1/2 W
R24	QRD161J-102	"	1 K 1/6 W
R25	" -122	"	1.2 K "
R26	" -472	"	4.7 K "
R27	QRZ0052-331	FR	330
R28	QRD161J-682	CR	6.8 K 1/6 W
R29	" -122	"	1.2 K "
⚠R30	QRG019J-222S	OMR	2.2 K 1 W
R31	QRD161J-103	CR	10 K 1/6 W
R32	" -104	"	100 K "
R33	" -331	"	330 "
R34	–	–	
R35	–	–	
R36	QRX126J-R47A	MFR	0.47 1/2 W
R37	–	–	
R38	–	–	
R39	–	–	
R40	–	–	
R41	–	–	
R42	–	–	
R43	–	–	
R44	–	–	
R45	–	–	

Symbol No.	Part No.	Part Name	Description
R46	–	–	
R47	–	–	
R48	–	–	
R49	–	–	
⚠R50	PU52108-2R2K	Posistor	2.2 1/4 W
R51	–	–	
R52	–	–	
R53	QRD187J-273	CR	27 K 1/8 W
R54	–	–	
R55	QRD161J-103	CR	10 K 1/6 W
R56	" -103	"	10 K "
R57	" -683	"	68 K "
R58	" -104	"	100 K "
R59	QRD181J-102	"	1 K 1/8 W
R60	QRD161J-333	"	33 K 1/6 W
R61	QRD181J-102	"	1 K 1/8 W
R62	" -102	"	1 K "
R63	" -102	"	1 K "
R64	QRD161J-103	"	10 K 1/6 W
R65	QRD181J-151	"	150 1/8 W
R66	QRD161J-224	"	220 K 1/6 W
R67	" -564	"	560 K "
R68	" -333	"	33 K "
R69	" -222	"	2.2 K "
R70	" -220	"	22 "
R71	" -105	"	1 M "
R72	" -220	"	22 "
R73	" -105	"	1 M "
R74	" -333	"	33 K "
R75	" -104	"	100 K "
R76	" -333	"	33 K "
R77	" -563	"	56 K "
R78	" -683	"	68 K "
R79	QRD181J-103	"	10 K 1/8 W
R80	" -103	"	10 K "
R81	" -103	"	10 K "
R82	" -103	"	10 K "
R83	QRD161J-224	"	220 K 1/6 W
R84	" -333	"	33 K "
R85	" -392	"	3.9 K "
R86	–	–	
R87	QRD161J-333	CR	33 K 1/6 W
R88	" -103	"	10 K "
R89	" -223	"	22 K "
R90	–	–	
R91	QRD161J-333	CR	33 K 1/6 W
R92	" -103	"	10 K "
R93	–	–	
R94	QRD161J-273	CR	27 K 1/6 W
R95	–	–	
R96	–	–	
R97	–	–	
R98	–	–	
R99	QRD167J-103	CR	10 K 1/6 W EK
R100	–	–	
R101	QRD187J-103	CR	10 K 1/8 W
R102	QRD161J-222	"	2.2 K 1/6 W
R103	" -102	"	1 K "

Symbol No.	Part No.	Part Name	Description
RA51	EXB-P84104M	Resistor Array	
RA52	EXB-P85333M	"	
RA53	FRE3333M	"	
⚠C 1	QFH52AM-104	MM Cap	0.1 100 V
⚠C 2	QCF32HP-103	C Cap	0.01 500 V
⚠C 3	" -103	"	0.01 "
⚠C 4	" -103	"	0.01 "
⚠C 5	" -103	"	0.01 "
⚠C 6	QEL71VR-478	E Cap	4700 35 V
⚠C 7	PU54990-5	"	1000 25 V
⚠C 8	" -5	"	1000 "
C 9	QET61EM-106	"	10 "
C10	PU52802-107	"	100 16 V
C11	–	–	
C12	QET61CM-107	E Cap	100 16 V
C13	–	–	
C14	–	–	
C15	–	–	
C16	–	–	
C17	–	–	
C18	–	–	
C19	–	–	
C20	QFN31HJ-103	MY Cap	0.01 50 V
⚠C21	QFH52AM-104	MM Cap	0.1 100 V
⚠C22	QET61VM-108	E Cap	1000 35 V
C23	" -336	"	33 "
C24	QER51EM-106	"	10 25 V
C25	QFN31HJ-103	MY Cap	0.01 50 V
C26	QET61EM-107	E Cap	100 25 V
C27	QET61AM-476	"	47 10 V
⚠C28	QFH52AM-104	MM Cap	0.1 100 V
⚠C29	QET61JM-107	E Cap	100 63 V
⚠C30	" -337	"	330 "
C31	QET61HM-226	"	22 50 V
C32	–	–	
C33	QCF31HP-103	C Cap	0.01 50 V
C34	" -103	"	0.01 "
C35	QCS31HJ-220	"	22 pF "
C36	" -220	"	22 pF "
C37	–	–	
C38	QER41CM-336	E Cap	33 16 V
C39	–	–	
C40	–	–	
C41	–	–	
C42	–	–	
C43	–	–	
C44	–	–	
C45	QCF31HP-103	C Cap	0.01 50 V
C46	" -103	"	0.01 "
C47	QCF11HP-223	"	0.022 "
C48	" -473	"	0.047 "
C49	–	–	
C50	–	–	
C51	QCS31HJ-270	C Cap	27 pF 50 V
C52	–	–	
C53	QET61HM-475	E Cap	4.7 50 V
C54	–	–	
C55	–	–	

Symbol No.	Part No.	Part Name	Description
C56	–	–	
C57	QCF31HP-103	C Cap	0.01 50 V
C58	QET61CM-106	E Cap	10 16 V
C59	QCF31HP-103	C Cap	0.01 50 V
C60	PU52749-474	E Cap	0.47 5.0 V
C61	QET61HM-474	"	0.47 50 V
C62	QCS31HJ-330	C Cap	33 pF "
C63	QET61HM-106	E Cap	10 "
C64	QEK41HM-106	"	10 "
C65	–	–	
C66	QCF11HP-223	C Cap	0.022 50 V
C67	" -223	"	0.022 "
C68	" -223	"	0.022 "
⚠L 1	PU56182-331	Choke Coil	330
⚠X 1	PU56805	Crystal	
⚠RY 1	PU56551	Relay	
IB 1	PU33106-059	Inline Block	
IB 2	" -061	"	
IB 3	" -066	"	
CN 1	PU56535-20	Recep. Housing	
CN 2	" -7	"	
CN 3	" -6	"	
CN 4	–	–	
CN 5	PU56324-4	Connector Base	
CN 6	PU50597-4	Cap. Housing	for P.T.
CN 7	A75802-3	Mini Conn. Base	"
CN 8	–	–	
CN 9	PU50356-8	Cap. Housing	
CN10	PU43351-2Y	"	
CN11	–	–	
CN12	PU43351-2	Cap. Housing	
CN13	–	–	
CN14	–	–	
CN15	–	–	
CN16	PU43351-4	Cap. Housing	
CN17	" -2R	"	
⚠CP 1	ICP-F10	IC Protector	
	PU56560	Heat Sink	for Q1, 2, 3 (EG) for Q2, 10 (EK)
	PU41624-6	Isolation Washer	
	PU45375-3	Spacer	
	SPSP3008Z	Screw	
	DPSP3008Z	"	

Symbol No.	Part No.	Part Name	Description
	PU45908-2	Test Pin	for TP1, 2
⚠K 1	PU56179	Ferrite Beads	
⚠K 2	"	"	
⚠	PU51212	Fuse Clip	for F3, 4, 5

The following not included in the Board Ass'y

Symbol No.	Part No.	Part Name	Description
⚠F 3	QMF51E2-2R5	Fuse	T2.5 A 250 V
⚠F 4	" -R50	"	T500 mA "
⚠F 5	" -R315	"	T315 mA "

5.1.2 Front board ass'y $\boxed{0}\boxed{2}$ . . . . PU21949A . . . . EG
PU21949C-1 . . . EK

Symbol No.	Part No.	Part Name	Description
IC 1	UPC1373H	Integrated Circuit	or UPC1373HA EG
	LA7225	"	EK
⚠ IC 2	UPD7519H-013-36	"	
IC 3	TL066CP	"	
Q 1	DTC144WF	D. Transistor	
Q 2	2SA874Q,R	Transistor	
Q 3	DTC124F	D. Transistor	
Q 4	2SD637R	Transistor	
D 1	–	–	
D 2	SLR-34VC12F	L.E.D.	(CHARGE)
D 3	PH302	Photo Diode	
D 4	–	–	
D 5	MA167	Diode	
D 6	"	"	
D 7	"	"	
D 8	"	"	
D 9	"	"	
D10	–	–	
D11	MA167	Diode	
D12	"	"	
D13	"	"	
D14	"	"	
D15	RD4.3EB	Zener Diode	
D16	HZ7B-1L	"	or HZ7B-2L
D17	MA167	Diode	EK
D18	"	"	EK
R 1	QRD161J-333	CR	33 K 1/6 W
R 2	QRD167J-333	"	33 K "
R 3	–	–	
R 4	–	–	
R 5	–	–	
R 6	–	–	
R 7	QRD161J-102	CR	1 K 1/6 W
R 8	–	–	
R 9	QRD161J-102	CR	1 K 1/6 W
R10	" -182	"	1.8 K "
R11	" -100	"	10 "
R12	" -154	"	150 K "
R13	" -333	"	33 K "
R14	" -104	"	100 K "
R15	" -104	"	100 K "
R16	" -222	"	2.2 K "
R17	" -103	"	10 K "
R18	" -103	"	10 K "
R19	" -103	"	10 K "
R20	" -103	"	10 K "
R21	" -104	"	100 K "
R22	" -103	"	10 K "
R23	" -222	"	2.2 K "
R24	" -103	"	10 K "
R25	" -103	"	10 K "
R26	" -472	"	4.7 K "
R27	" -102	"	1 K "
R28	–	–	
R29	–	–	
R30	–	–	
R31	–	–	
R32	QRD161J-102	CR	1 K 1/6 W
R33	" -102	"	1 K "
R34	" -103	"	10 K "
R35	" -473	"	47 K "
R36	" -563	"	56 K "
R37	" -824	"	820 K "
R38	" -473	"	47 K "
R39	" -333	"	33 K "
R40	" -334	"	330 K "
R41	" -823	"	82 K "
R42	" -333	"	33 K "
RA 1	EXB-P88333M	Resistor Array	
RA 2	"	"	
RA 3	EXB-P86333M	"	
RA 4	EXB-P86104M	"	
C 1	QER41CM-476	E Cap	47 16 V
C 2	QEK61CM-106	"	10 "
C 3	QEK60JM-476	"	47 6.3 V
C 4	QFN41HJ-333	MY Cap	0.033 50 V EG
	" -472	"	0.0047 " EK
C 5	QEK61CM-106	E Cap	10 16 V
C 6	–	–	
C 7	QAT3001-011	TR Cap	18 pF
C 8	QCS11HJ-5R0	C Cap	5 pF 50 V
C 9	QCF11HP-473	"	0.047 "
C10	–	–	
C11	QER51CM-106	E Cap	10 16 V
C12	QFN41HJ-153	MY Cap	0.015 50 V
C13	–	–	
C14	QER51HM-225G	E Cap	2.2 50 V
C15	QEK61HM-225	"	2.2 "
C16	" -225	"	2.2 "
C17	QCF11HP-223	C Cap	0.022 "
C18	" -223	"	0.022 "
C19	" -473	"	0.047 "
C20	–	–	
C21	QFN41HJ-472	MY Cap	0.0047 50 V
C22	QER41HM-105	E Cap	1 "
L 1	PU49994-101	Peaking Coil	100 μH
L 2	" -101	"	100 μH EG
	QRD187J-152	CR	1.5 K 1/8 W EK
T 1	PU52612	Resonator	

Symbol No.	Part No.	Part Name	Description
SW 1	PU52621	Push Switch	TIMER
SW 2	PU53598	Tact Switch	CHARGE
SW 3	–	–	
SW 4	PU56548	Slide Switch	INPUT SELECT
SW 5	PU53598	Tact Switch	CLOCK
SW 6	"	"	CLOCK ADJ
SW 7	"	"	START
SW 8	"	"	DAY
SW 9	"	"	CH SET
SW10	–	–	
SW11	PU53598	Tact Switch	AUTO I EG
SW12	–	–	
SW13	PU53598-2	Tact Switch	CH DOWN
SW14	PU53598	"	PROGRAM
SW15	"	"	STOP
SW16	"	"	HOUR
SW17	"	"	AUTO III EG
SW18	"	"	MANUAL –
SW19	PU53598-2	"	CH UP
SW20	–	–	
SW21	PU53598	Tact Switch	CANCEL
SW22	"	"	CHANNEL
SW23	"	"	MIN +
SW24	"	"	SKIP
SW25	"	"	AUTO U
SW26	"	"	MANUAL +
SW27	"	"	REPEAT
SW28	"	"	MIN –
SW29	"	"	STORE
SW30	PU52621	Push Switch	EG
⚠X 1	PU47695-2	Crystal	
FDP 1	PU56056-4	FDP	EG
	" -3	"	EK
	PQ40795-3	LED Holder	for D1, D2
	PU45908-2	Test Pin	TP1, 2, 3
CN 1	PU56543-20	Board HSG Ass'y	for Bottom
CN 2	" -7	"	"
CN 3	" -6	"	"
CN 4	PU53587-4	Cap. Housing	for TU/IF
	PU56536-1-1	Shield Case	
	PU56538-1-1	Shield Plate	
	PU34795	FDP Holder	
	PU50626-5	Cushion	

5.1.3 IF board ass'y [0][3] . . . PU21824B1 . . . . EG
PU21824C1 . . . . EK

Symbol No.	Part No.	Part Name	Description
IC 1	M51316P	Integrated Circuit	
IC 2	LA7913	"	
Q 1	2SC2636T	Transistor	
Q 2	2SD1330S	"	
Q 3	2SA1254C	"	
Q 4	2SC2647C	"	
Q 5	2SD637R,S	"	
Q 6	2SD637R	"	
Q 7	2SD637P,Q,R	"	
Q 8	2SD1206R	"	
Q 9	DTC144F	D. Transistor	
Q10	2SB598E,F	Transistor	
Q11	2SB644P,Q,R	"	
Q12	2SD637R,S	"	
Q13	2SC2636T	"	EG
Q14	–	–	
Q15	DTC144EF	D. Transistor	
D 1	RD6.8EB2	Zener Diode	
D 2	1SS133	Diode	
D 3	"	"	
D 4	"	"	
D 5	"	"	
D 6	LTZ-R15	"	
D 7	UPC574J-KL	Integrated Circuit	
D 8	1SS133	Diode	
D 9	"	"	
D10	–	–	
D11	1SS152	Diode	EG
D12	RD4.3EB	Zener Diode	
R 1	QRD161J-472	CR	4.7 K 1/6 W
R 2	" -102	"	1 K "
R 3	" -470	"	47 "
R 4	" -222	"	2.2 K " EG
	" -681	"	680 " EK
R 5	" -121	"	120 " EG
	" -151	"	150 " EK
R 6	" -221	"	220 " EG
R 7	" -820	"	82 " EG
R 8	" -332	"	3.3 K " EG
R 9	" -222	"	2.2 K "
R10	QVZ1802-472	VR	4.7 K 1/8 W
R11	QRD161J-102	CR	1 K 1/6 W
R12	" -153	"	15 K "
R13	" -334	"	330 K "
R14	QRZ0052-100	FR	10
R15	QRD161J-471	CR	470 1/6 W
R16	" -471	"	470 "
R17	" -104	"	100 K "
R18	" -332	"	3.3 K "

Symbol No.	Part No.	Part Name	Description
R19	QVZ1802-103	VR	10 K 1/8 W
R20	QRD161J-681	CR	680 1/6 W EG
	" -471	"	470 " EK
R21	" -471	"	470 " EG
	" -331	"	330 " EK
R22	" -101	"	100 "
R23	" -331	"	330 "
R24	" -223	"	22 K "
R25	—	—	
R26	QRD161J-102	CR	1 K 1/6 W
R27	" -563	"	56 K "
R28	" -273	"	27 K "
R29	" -102	"	1 K "
R30	" -271	"	270 "
R31	" -104	"	100 K "
R32	" -392	"	3.9 K "
R33	QVZ1802-332	VR	3.3 K 1/8 W
R34	QRD161J-103	CR	10 K 1/6 W EG
R35	" -391	"	390 "
R36	" -150	"	15 "
R37	" -103	"	10 K "
R38	" -103	"	10 K "
R39	" -103	"	10 K "
R40	" -334	"	330 K "
R41	" -103	"	10 K "
R42	" -331	"	330 "
R43	" -223	"	22 K "
R44	" -471	"	470 "
R45	" -222	"	2.2 K "
R46	" -103	"	10 K "
R47	" -104	"	100 K "
R48	" -104	"	100 K "
R49	" -472	"	4.7 K "
R50	" -103	"	10 K "
R51	" -224	"	220 K "
R52	" -103	"	10 K "
R53	" -104	"	100 K "
R54	" -124	"	120 K "
R55	" -104	"	100 K "
R56	" -332	"	3.3 K "
R57	" -103	"	10 K "
R58	" -121	"	120 "
R59	" -473	"	47 K "
R60	" -333	"	33 K "
R61	" -103	"	10 K "
R62	" -394	"	390 K "
R63	" -154	"	150 K "
R64	" -154	"	150 K "
R65	" -154	"	150 K "
R66	" -220	"	22 "
R67	" -103	"	10 K "
R68	—	—	
R69	—	—	
R70	QRD161J-472	CR	4.7 K 1/6 W EG
R71	—	—	
R72	QRD161J-103	CR	10 K 1/6 W
R73	" -750	"	75 "
⚠ R74	" -472	"	4.7 K " EG
R75	" -821	"	820 " EG
R76	" -220	"	22 " EG
R77	" -151	"	150 " EG
R78	" -560	"	56 " EG
R79	" -473	"	47 K "
R80	" -473	"	47 K "
R81	" -103	"	10 K "

Symbol No.	Part No.	Part Name	Description
R82	QRD161J-223	CR	22 K 1/6 W
R83	—	—	
R84	QRD161J-121	CR	120 1/6 W EG
R85	—	—	
R86	QRD161J-823	CR	82 K 1/6 W
R87	" -103	"	10 K " EG
R88	—	—	
R89	QRD161J-100	CR	10 1/6 W
R90	—	—	
R91	QRD161J-332	CR	3.3 K 1/6 W
R92	—	—	
R93	—	—	
R94	—	—	
R95	PU52108-4R7	Posistor	4.7
C 1	QCF31HP-102	C Cap	0.001 50 V
C 2	" -102	"	0.001 "
C 3	" -222	"	0.0022 "
C 4	—	—	
C 5	QCF31HP-222	C Cap	0.0022 50 V
C 6	QET61CM-106	E Cap	10 16 V
C 7	QET61EM-475	"	4.7 25 V
C 8	QFN31HK-473	MY Cap	0.047 50 V
C 9	QET61CM-106	E Cap	10 16 V
C10	QCF31HP-222	C Cap	0.0022 50 V
C11	QFN31HK-473	MY Cap	0.047 "
C12	QCF31HP-222	C Cap	0.0022 "
C13	" -222	"	0.0022 "
C14	QCT25CH-3R0	"	3 pF
C15	QCF31HP-222	"	0.0022 50 V
C16	" -222	"	0.0022 "
C17	QFN31HK-473	MY Cap	0.047 "
C18	QET61CM-336	E Cap	33 16 V
C19	QCS31HJ-470	C Cap	47 pF 50 V
C20	QET61CM-106	E Cap	10 16 V
C21	QFN31HK-102	MY Cap	0.001 50 V
C22	—	—	
C23	QCF31HP-223	C Cap	0.022 50 V
C24	QCS31HJ-101	"	100 pF "
C25	QFN31HK-332	MY Cap	0.0033 "
C26	QCT25CH-6R0	C Cap	6 pF
C27	QCT25HH-680	"	68 pF
C28	QCF31HP-102	"	0.001 50 V
C29	QCT25LH-560	"	56 pF
C30	QCT25CH-180	"	18 pF
C31	QCF31HP-222	"	0.0022 50 V
C32	—	—	
C33	QET61CM-336	E Cap	33 16 V
C34	" -106	"	10 "
C35	QCS31HJ-220	C Cap	22 pF 50 V
C36	" -120	"	33 pF " EG
C37	QFN31HK-102	MY Cap	0.001 "
C38	" -104	"	0.1 "
C39	QET61CM-106	E Cap	10 16 V
C40	QFN31HK-223	MY Cap	0.022 50 V
C41	" -223	"	0.022 "
C42	QET61EM-475	E Cap	4.7 25 V
C43	QCS31HJ-221	C Cap	220 pF 50 V
C44	QET61HM-105	E Cap	1 "
C45	—	—	

Symbol No.	Part No.	Part Name	Description
C46	QET60JM-476	E Cap	47 6.3 V
C47	QCS31HJ-101	C Cap	100 pF 50 V
C48	QET61HM-106	E Cap	10 "
C49	QFN31HK-333	MY Cap	0.033 "
C50	" -153	"	0.015 "
C51	" -333	"	0.033 "
C52	" -153	"	0.015 "
C53	" -104	"	0.1 "
C54	QET61EM-475	E Cap	4.7 25 V
C55	–	–	
C56	–	–	
C57	QCY31HK-222	C Cap	0.0022 50 V EG
C58	–	–	
C59	–	–	
C60	QCF31HP-103	C Cap	0.01 50 V
C61	QET61CM-337	E Cap	330 16 V
C62	QET61HM-105	"	1 50 V
C63	QET61CM-106	"	10 16 V
C64	QFN31HK-104	MY Cap	0.1 50 V
C65	QCF31HP-222	C Cap	0.0022 " EG
C66	" -222	"	0.0022 " EG
C67	" -102	"	0.001 " EG
C68	" -102	"	0.001 " EG
C69	QET61AM-107	E Cap	100 10 V
C70	QCF11HP-473	C Cap	0.047 50 V
L 1	PU53606-R82	Coil	EG
	" -1R0	"	EK
L 2	PU48530-6R8J	Peaking Coil	
L 3	" -100J	"	
L 4	" -150J	"	EG
	" -120J	"	EK
L 5	" -470J	"	
L 6	" -271J	"	
L 7	" -101J	"	
L 8	–	–	
L 9	PU49995-R22	Coil	EG
SAW 1	PU34218	Saw Filter	EG
	PU32987-11	"	EK
CF 1	PU55270	Ceramic Filter	5.5 MHz EG
	" -2	"	6 MHz EK
CF 2	PU57707-2	"	5.5 MHz EG
	PU57707	"	6 MHz EK
CF 3	PU32990-2	"	5.5 MHz EG
	" -3	"	6 MHz EK
T 1	PU55955-3	Coil	34.47 MHz EG
			35.07 MHz EK
T 2	PU55267	IFT	33.4 MHz EG
			33.5 MHz EK
T 3	PU55957-3	Coil	38.9 MHz EG
			39.5 MHz EK
T 4	PU55268	IFT	38.9 MHz EG
			39.5 MHz EK
T 5	PU51467	"	15.625 kHz
T 6	PU57228-2	Coil	EG

Symbol No.	Part No.	Part Name	Description
CN 1	PU43351-4R	Cap. Housing	
CN 2	" -5	"	
CN 3	" -2	"	
CN 4	" -2Y	"	
CN 5	" -4	"	
CN10	PU49215-8	Cap. Housing	
	PU45908-3	Test Pin	for TP22, 23
	PU51721	"	for TP2, 14
	QMC0131-002	Jack	

5.1.4 Tuner board ass'y $\boxed{0}\boxed{4}$ PU21824B2 .... EG PU21824C2 .... EK

Symbol No.	Part No.	Part Name	Description
⚠	PU34219-8-1	Tuner	EG
⚠	PU32997-4	"	EK
R25	QRD161J-224	CR	220 K 1/6 W
R68	QRD161J-472	CR	4.7 K 1/6 W
R69	" -224	"	4.7 K "
R70	–	–	
R71	QRD161J-472	CR	4.7 K 1/6 W
C32	QET61HM-225	E Cap	2.2 50 V
C45	QET61HM-474	E Cap	0.47 50 V
C55	QET61CM-106	E Cap	10 16 V
C56	QET61HM-105	"	1 50 V
C57	QET61CM-106	"	10 16 V
C58	" -106	"	10 "
C59	" -107	"	100 "

5.1.5 RF SW (Mix Booster) board ass'y $\boxed{0}\boxed{5}$ ..... PU21824B3 ...... EG PU21824C3 ...... EK

Symbol No.	Part No.	Part Name	Description
⚠	PU57501	Mix Booster	EG
⚠	" -2	"	EK

5.1.6 Bottom sub board ass'y $\boxed{0}\boxed{6}$ PU11077A2

Symbol No.	Part No.	Part Name	Description
IC 1	UPC1042C	Integrated Circuit	
Q 1	–	–	
Q 2	–	–	
Q 3	–	–	
Q 4	DTA144F	D. Transistor	
Q 5	DTC144F	"	
Q 6	"	"	
Q 7	–	–	
Q 8	N13T1	PUT	
R 1	–	–	
R 2	–	–	
R 3	–	–	
R 4	–	–	
R 5	–	–	
R 6	–	–	
R 7	–	–	
R 8	QRD161J-223	CR	22 K 1/6 W
R 9	" -332	"	3.3 K "
R10	QVZ3244-472	VR	4.7 K
R11	QRD161J-682	CR	6.8 K 1/6 W
R12	" -334	"	330 K "
R13	" -333	"	33 K "
R14	" -183	"	18 K "
R15	" -272	"	2.7 K "
R16	" -222	"	2.2 K "
R17	–	–	
R18	QRD161J-101	CR	100 1/6 W
R19	" -152	"	1.5 K "
R20	" -682	"	6.8 K "
R34	QRD161J-152	CR	1.5 K 1/6 W
R35	" -682	"	6.8 K "
R36	–	–	
R37	–	–	
R38	QRD161J-182	CR	1.8 K 1/6 W
C 1	–	–	
C 2	–	–	
C 3	–	–	
C 4	–	–	
C 5	–	–	
C 6	–	–	
C 7	–	–	
C 8	–	–	
C 9	–	–	
C10	–	–	
C11	QFN31HJ-223	MY Cap	0.022 50 V
C12	–	–	
C13	QET61EM-476	E Cap	47 25 V
C14	QFN31HJ-102	MY Cap	0.001 50 V
C15	QET61EM-106	E Cap	10 25 V
C16	QCS31HJ-221	C Cap	220 P 50 V
C17	" -560	"	56 P "
C18	QFN31HJ-104	MY Cap	0.1 "
C19	" -103	"	0.01 "
C39	QEK41AM-336	E Cap	33 10 V
CN 4	PU53587-2	Cap. Housing	
CN 9	PU50355-8	"	

5.1.7 Power Transformer board ass'y 0 7 PU35454A-1

Symbol No.	Part No.	Part Name	Description
⚠C 1	QFE52EM-223M	MM Cap	0.022 250 V
⚠T 1	PU57297	Line Filter	
⚠	PU51212	Fuse Clip	
The following not included in the Board Ass'y			
⚠F 1	QMF51E2-1R0	Fuse	T 1A 250 V

5.1.8 Terminal board ass'y 0 8 PU11077A3 . . . . . EG
PU11077B3 . . . . . EK

Symbol No.	Part No.	Part Name	Description
	PU57492A	Terminal Ass'y	EG
	PU57492B	"	EK
R90	QRD161J-681	CR	680 1/6 W
R91	–	–	
R92	–	–	
R93	–	–	
R94	–	–	
R95	QRD161J-561	CR	560 1/6 W
R96	" -430	"	43 "
R97	" -330	"	33 "
R98	" -222	"	2.2 K " EK
C65	QFN31HJ-562	MY Cap	0.0056 50 V
D54	11E2	Diode	
RY2	PU54301	Relay	
CN13	PU53587-10	Cap. Housing	

5.1.9 Remote control board ass'y

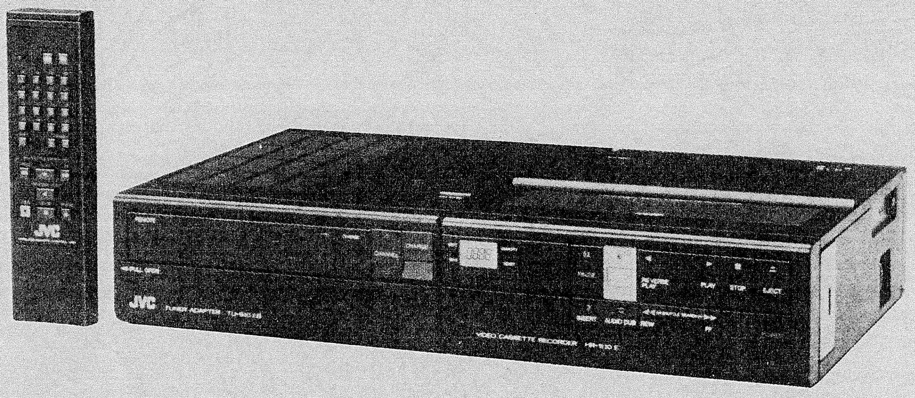
Symbol No.	Part No.	Part Name	Description
IC 1	M50115AP	Integrated Circuit	
Q 1	2SD636Q,R,S	Transistor	
Q 2	"	"	
Q 3	2SB822Q,R	"	
D 1	MA154WA	Diode	
D 2	"	"	
D 3	"	"	
D 4	"	"	
D 5	"	"	
D 6	"	"	
D 7	"	"	
D 8	"	"	
D 9	"	"	
D10	"	"	
D11	MA154WK	"	
D12	"	"	
D13	SE303A	LED	
D14	SR538D	"	
D15	SE303A	"	
R 1	QRD181J-104	CR	100 K 1/8 W
R 2	" -474	"	470 K "
R 3	" -222	"	2.2 K "
R 4	" -470	"	47 "
R 5	" -471	"	470 "
R 6	" -180	"	18 "
R 7	" -1R2	"	1.2 "
R 8	" -1R2	"	1.2 "
C 1	QCF11HP-101	C Cap	100 pF 50 V
C 2	" -101	"	100 pF "
C 3	QET40JM-107	E Cap	100 6.3 V
X 1	CSB455EB	Ceramic Filter	

JVC

SERVICE MANUAL

VIDEO KASSETTEN RECORDER VHS PAL

HR-S10EG Deutsche Abgleichanleitung



SPEZIFIKATION

Format : VHS PAL standard
Recording system : Rotary, slant azimuth two-head helical scan system
Video signal system : PAL-type colour and CCIR monochrome signal
Tape width : 12.65 mm
Tape speed : 23.39 mm/sec.
Maximum recording time : 240 min. with JVC E-240 video cassette
Temperature
  Operating : 0°C to 40°C
  Storage : – 20°C to 60°C
RF output signal : UHF channels 36 – 40 (adjustable, preset to UHF channel 36 when shipped)
Power consumption : 6 W (16 W with camera)
Power requirement : 12 V
Camera connector output : 12 V, 10 W maximum

Video
  Input : 0.5 to 2.0 Vp-p, 75 ohms, unbalanced (using the provided dubbing connector)
  Output : 1.0 Vp-p, 75 ohms, unbalanced (using the provided dubbing connector)
Signal-to-noise ratio : 43 dB (Rohde & Schwarz noise meter)
Horizontal resolution : More than 250 lines

Audio
  Input : Microphone: – 67 dBs, 10 k-ohms, unbalanced
  Line: – 20 dBs, 50 k-ohms, unbalanced (using the provided dubbing connector)
  Output : Earphone: Mini-jack
  Line: – 6 dBs, 1 k-ohm, unbalanced (using the provided dubbing connector)
  Signal-to-noise ratio : More than 40 dB
  Frequency range : 70 Hz to 10,000 Hz
Dimensions : 204 (W) x 80 (H) x 225 (D) mm
Weight : 2,4 kg

Provided accessories
- Aerial cable x 2
- Shoulder strap
- Antenna selector
- Dubbing connector
- Connector cover
- Dummy battery
- Video cassette

Optional accessories
- TU-S10EK/ES/EG Tuner/adapter
- NB-P4U High-capacity battery pack (1.2 AH)
- NB-P3U Regular battery pack (0.75 AH)
- BB-P3EK/EG Battery charger
- AC-P3EK/EG AC power pack
- AP-P3E Car battery adapter
- CB-P10U System carrying case
- CB-P11U Carrying bag (for outdoor shooting)
- Video cassette

E. & O. E. Design and specifications subject to change without notice.

No. 8370-T
Februar 1985

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2 EINSTELLANWEISUNG DER MECHANIK

2.1 Allgemeine Hinweise

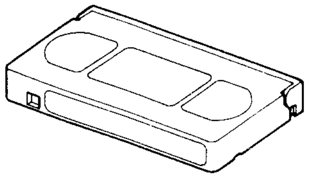
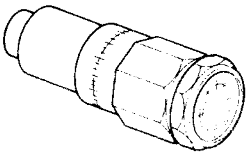
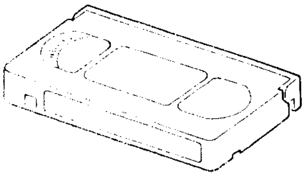
2.1.1 Vorbereitung

1. Vor dem Austausch oder Entlöten von Bauteilen wird das Gerät vom Netz getrennt.
2. Die Mechanik des Bandtransportsystems wurde im Werk präzise eingestellt, deswegen ist eine Nachjustage normalerweise nicht nötig.
3. Ziehen Sie alle Schrauben vorsichtig an, um eine Beschädigung des Chassis zu vermeiden.
4. Für die Serviceeinstellungen, die ohne eingefädeltes Band vorgenommen werden müssen, sind Start- und Endsensor abzudecken.

2.1.2 Erforderliche Einstellehren, Werkzeuge und Meßgeräte

Für eine einwandfreie Einstellung der Mechanik sind die später aufgeführten Einstellehren und Werkzeuge notwendig. Ohne diese Hilfsmittel ist kein befriedigendes Ergebnis zu erreichen.

1. Erforderliche Meßgeräte
   - Monitor oder Farbfernsehgerät
   - Zweikanaloszillograf mit einer Bandbreite von ≧ 20 MHz
   - Videocassette
   - Abgleichband MH-2

Alignment tapes MH-2 (Self Recording tapes E-180) 	Torque gauge assembly PUJ48075-2 	Back tension cassette gauge PUJ48076 

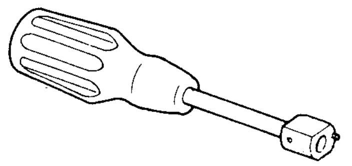
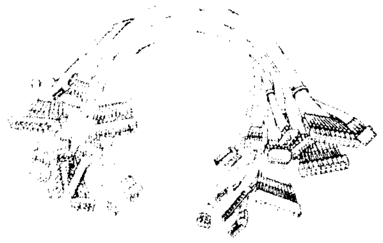
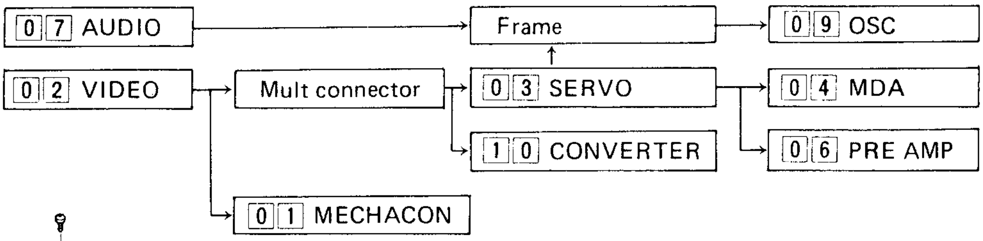
A/C head position tool PUJ47351-2 	Patch cord PUJ36857 

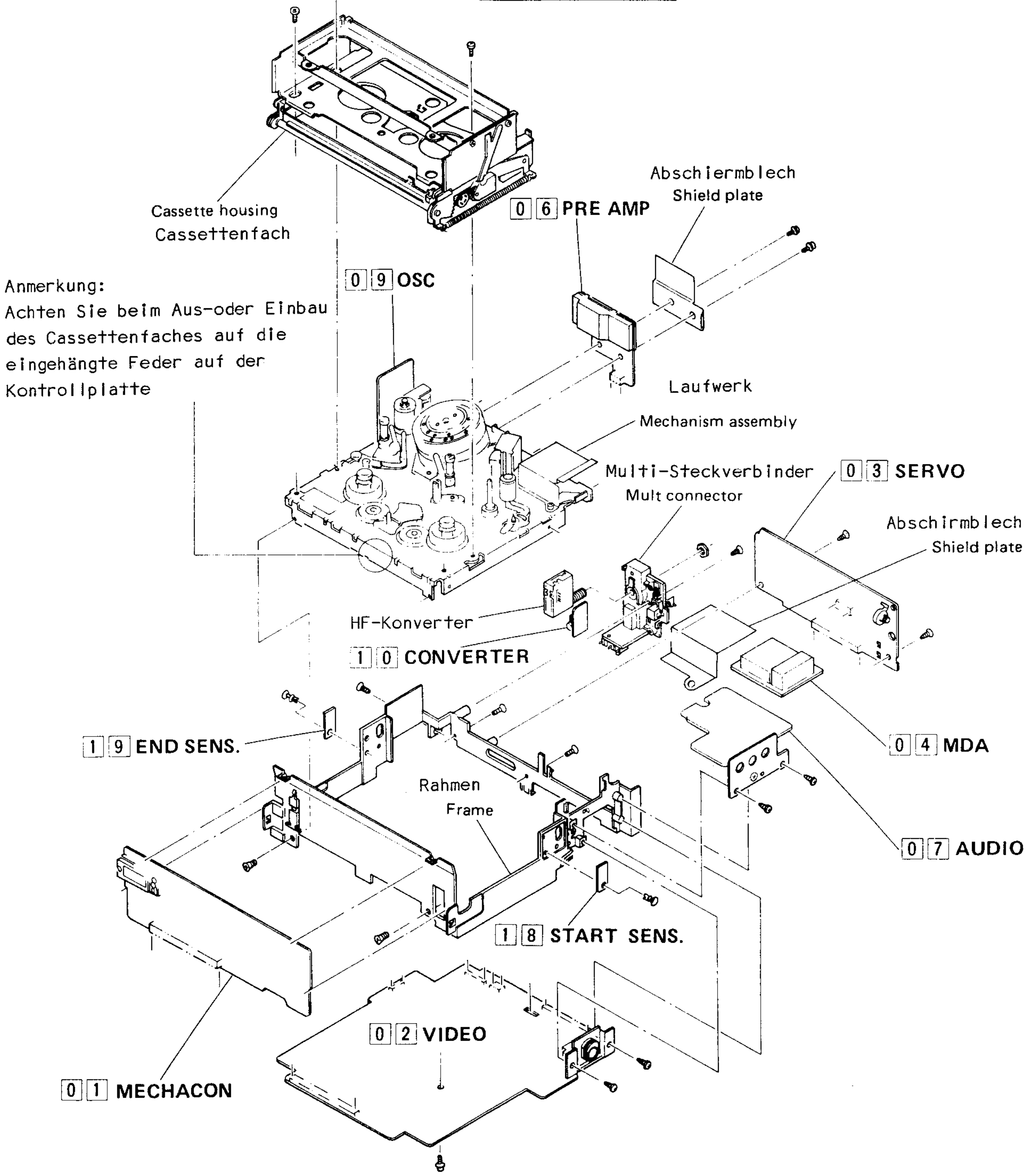
Tabelle 2-1 Werkzeuge und Hilfsmittel

Zusätzlich wird ein Standard-Werkzeugset incl. Inbus-Sechskantschlüssel benötigt.

2. Schaltplatinen

Reihenfolge des Ausbaues


07 AUDIO
Frame
09 OSC
02 VIDEO
Mult connector
03 SERVO
04 MDA
10 CONVERTER
06 PRE AMP
01 MECHACON


Cassette housing
Cassettenfach
06 PRE AMP
Abschiermblech
Shield plate
09 OSC
Laufwerk
Mechanism assembly
Multi-Steckverbinder
Mult connector
03 SERVO
Abschirmblech
Shield plate
HF-Konverter
10 CONVERTER
19 END SENS.
04 MDA
Rahmen
Frame
07 AUDIO
18 START SENS.
02 VIDEO
01 MECHACON

Anmerkung:
Achten Sie beim Aus-oder Einbau des Cassettenfaches auf die eingehängte Feder auf der Kontrollplatte

Bild 2-2 Ausbau der Schaltplatinen

2.1.3 Demontage

1. Gehäuse

Reihenfolge der Demontage

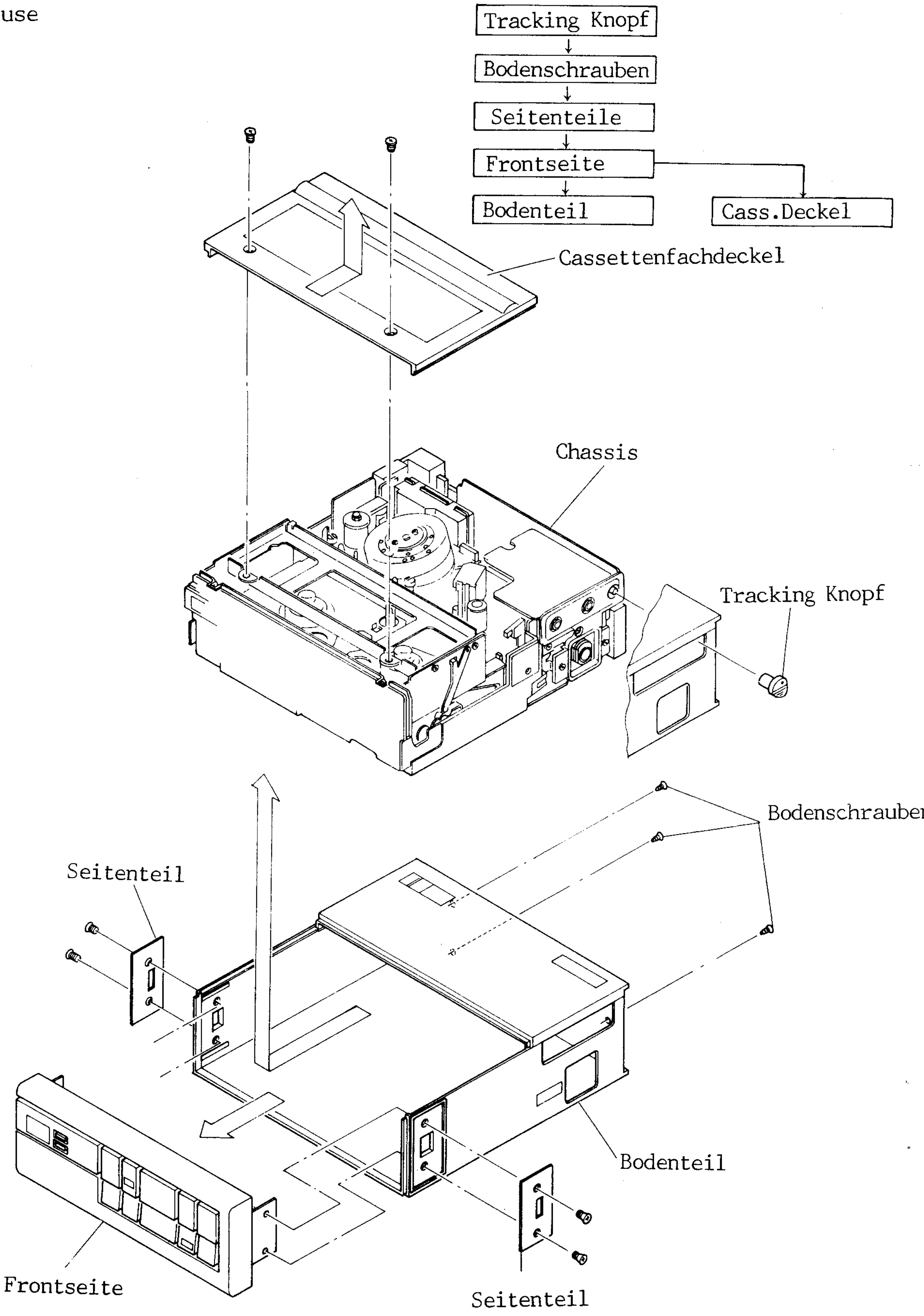

Tracking Knopf
Bodenschrauben
Seitenteile
Frontseite
Bodenteil
Cass.Deckel
Cassettenfachdeckel
Chassis
Tracking Knopf
Bodenschraube
Seitenteil
Bodenteil
Frontseite
Seitenteil

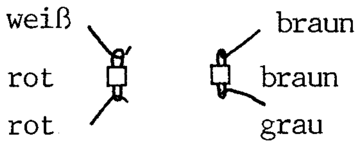
Bild 2-1 Demontage des Gehäuses

2.2 Ausbau der wichtigsten Baugruppen

Entfernen Sie das Gehäuse. Falls es erforderlich sein sollte, entfernen Sie Schaltplatinen und das Cassettenfach.

2.2.1 Ausbau der Kopftrommel (siehe Bild 2.5)

1. Löten Sie die vier Anschlußdrähte vorsichtig ab. (Löten Sie schnell, um eine Beschädigung der Litzen zu verhindern.)



Anschluß der Kopfleitungen

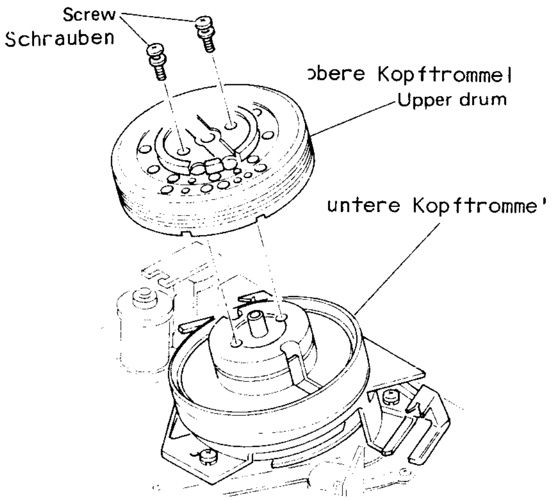


Bild 2-5

2. Entfernen Sie die beiden Schrauben, ziehen Sie die Kopftrommel vorsichtig nach oben ab.

3. Vor dem Einbau der neuen Kopftrommel ist die Unterseite der oberen Kopftrommel und die Oberseite der unteren Kopftrommel mit Alkohol zu reinigen. Ein Berühren der Videoköpfe und eine Beschädigung der Bandlauffläche ist zu vermeiden.

4. Nehmen Sie den Einbau in umgekehrter Reihenfolge vor. Beachten Sie die Anschlußfolge in Bild 2-4. Vermeiden Sie ein Überhitzen der Anschlußdrähte. Reinigen Sie alle Bandführungsteile mit Alkohol.

5. Überprüfen Sie die Exzentrizität der oberen Kopftrommel.
1) Schließen Sie einen Oszillografen an den TP-PB. FM (FM OUT) auf der Servoplatte an. Triggern Sie den Oszillografen extern mit dem Signal von TP-11 (DRUM F.F.) der Servoplatte.
2) Nehmen Sie ein Videosignal auf, schalten Sie anschließend auf Wiedergabe.
3) Kontrollieren Sie die FM-Hüllkurve auf gleichmäßigen Amplitudenverlauf. Hat die FM-Hüllkurve eine Form, wie sie in Bild 2-6 abgebildet ist, so ist ein nochmaliger Einbau der oberen Kopftrommel erforderlich.

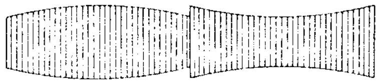


Bild 2-6

6. Nehmen Sie eine Einstellung und Überprüfung der FM-Hüllkurve nach Abschnitt 2.3.6 vor.

7. Nehmen Sie eine Einstellung des Kopfumschaltpunktes für Aufnahme und Wiedergabe nach Abschnitt 3.5.5, 3.5.6 und 3.5.9 vor.

2.2.2 Ausbau des Vollspurlöschkopfes (siehe Bild 2-7)

1. Lösen Sie die Mutter und entfernen Sie Flansch, Scheiben, Bandberuhigungsrolle, Hülse und die Feder.

2. Ziehen Sie den Stecker CN2 von der Oszillatorplatte ab.

3. Haken Sie die Drehfeder der Vollöschköpfe aus und ziehen Sie den Kopf nach oben ab.

4. Bauen Sie den neuen Vollspurlöschkopf ein. Achten Sie darauf, daß sich wieder alle übrigen Teile in ihrer Originalposition befinden.

5. Überprüfen Sie die Höhe der Impedanzrolle und kontrollieren Sie die FM-Hüllkurve nach Abschnitt 2.3.5 und 2.3.6.

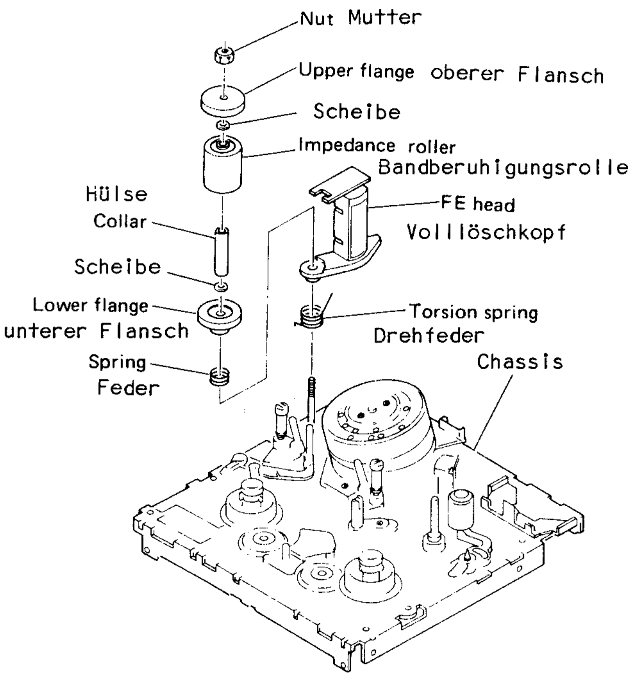

Nut Mutter
Upper flange oberer Flansch
Scheibe
Impedance roller
Bandberuhigungsrolle
Hülse
Collar
FE head
Volllöschkopf
Scheibe
Lower flange
unterer Flansch
Torsion spring
Drehfeder
Spring
Feder
Chassis

Bild 2-7

2.2.3 Ausbau des Audio/Synchronkopfes

1. Lösen Sie die Schraube, entfernen Sie die Abschirmung.

2. Lösen Sie die Stecker CN4 und CN5 von der Audioplatine und Stecker CN3 von der Servoplatine.

3. Entfernen Sie die beiden Halteschrauben und nehmen Sie den Audio/Synchronkopf heraus.

4. Erneuern Sie den Kopf und bauen Sie die Einheit in umgekehrter Reihenfolge wieder ein.

5. Nehmen Sie eine Einstellung und Überprüfung des Audio/Synchronkopfes nach Abschnitt 2.3.5 und 2.3.6 vor.

6. Bauen Sie das Abschirmblech wieder richtig ein.

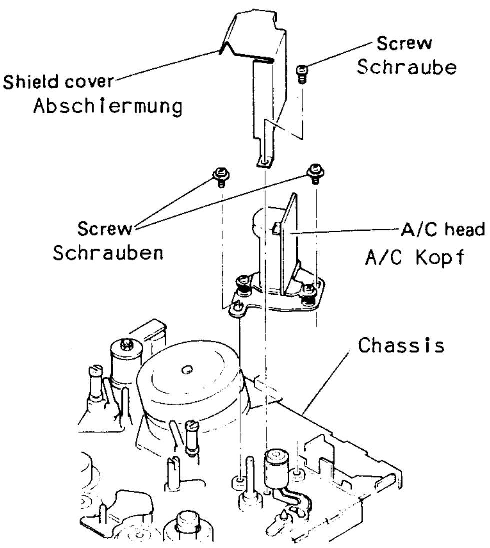

Screw
Schraube
Shield cover
Abschiermung
Screw
Schrauben
A/C head
A/C Kopf
Chassis

Bild 2-8 Ausbau des A/C Kopfes

2.2.4 Ausbau der Andruckrolle (siehe Bild 2.9)

1. Lösen Sie die Schraube und entfernen Sie Kappe, Hülse und Andruckrolle.

2. Erneuern Sie die Andruckrolle und bauen Sie sie wieder in umgekehrter Reihenfolge ein.

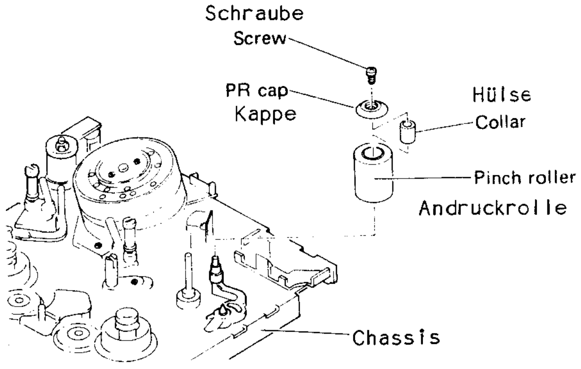

Schraube
Screw
PR cap
Kappe
Hülse
Collar
Pinch roller
Andruckrolle
Chassis

Bild 2-9

2.2.5 Ausbau des Capstan Motors
(siehe Bild 2-10)

1. Nehmen Sie den Wickeltellerriemen ab, ziehen Sie den Stecker CN4 von der Servoplatine ab.

2. Lösen Sie die drei Schrauben und nehmen Sie den Capstan Motor nach unten heraus. Gehen Sie vorsichtig vor, beachten Sie die Capstanbremse beim Ausbau!

3. Erneuern Sie den Capstan Motor, bauen Sie ihn wieder in umgekehrter Reihenfolge ein.

4. Nehmen Sie einen Abgleich des Capstan Diskriminators nach Abschnitt 3.5.2 vor.

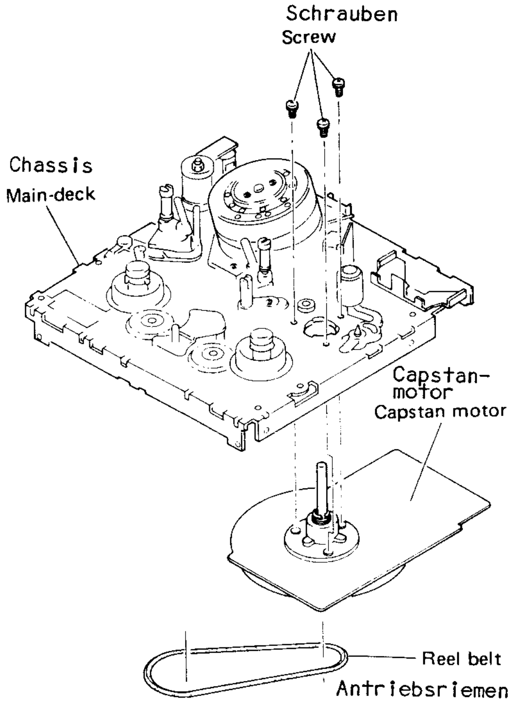

Schrauben
Screw
Chassis
Main-deck
Capstan-motor
Capstan motor
Reel belt
Antriebsriemen

Bild 2-10

2.2.6 Ausbau des Lademotors
(siehe Bild 2-11)

1. Ziehen Sie den Stecker CN10 von der MECHACON Platine ab.

2. Lösen Sie die drei Schrauben, nehmen Sie die Antriebseinheit heraus.

3. Erneuern Sie die Antriebseinheit und bauen Sie sie in umgekehrter Reihenfolge wieder ein.

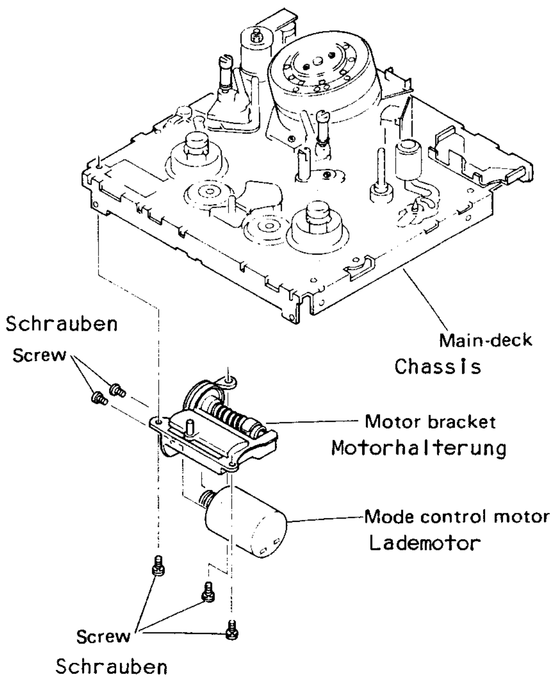

Schrauben
Screw
Main-deck
Chassis
Motor bracket
Motorhalterung
Mode control motor
Lademotor
Screw
Schrauben

Bild 2-11

Soll nun der Motor erneuert werden, so beachten Sie bitte die folgenden Punkte:

a) Löten Sie die Anschlußdrähte und den Kondensator ab.
b) Nehmen Sie den Antriebsriemen ab und trennen Sie den Motor durch Entfernen der zwei Schrauben von seiner Halterung.
c) Bauen Sie den neuen Motor in umgekehrter Reihenfolge wieder ein. Achten Sie auf die Polarität.

- braun
+ rot

2.2.7 Ausbau der Wickelteller
(siehe Bild 2-12)

- Abwickelteller

1. Lösen Sie das Bremsband vom Fühlhebel und legen Sie es zur Seite. Achten Sie auf die FF-Bremse.

2. Entfernen Sie die Sicherungsscheibe, lösen Sie die FF-Bremse und nehmen Sie den Abwickelteller nach oben ab. Achten Sie auf die Unterlegscheiben auf der Wickeltellerunterseite.

3. Reinigen Sie die Wickeltellerachse mit Alkohol und geben Sie vorsichtig einen Tropfen Nähmaschinenöl darauf. Vermeiden Sie ein Überölen.

4. Erneuern Sie den Abwickelteller und bauen Sie ihn in umgekehrter Reihenfolge wieder ein.

5. Überprüfen Sie den Bandzug nach Abschnitt 2.3.4.

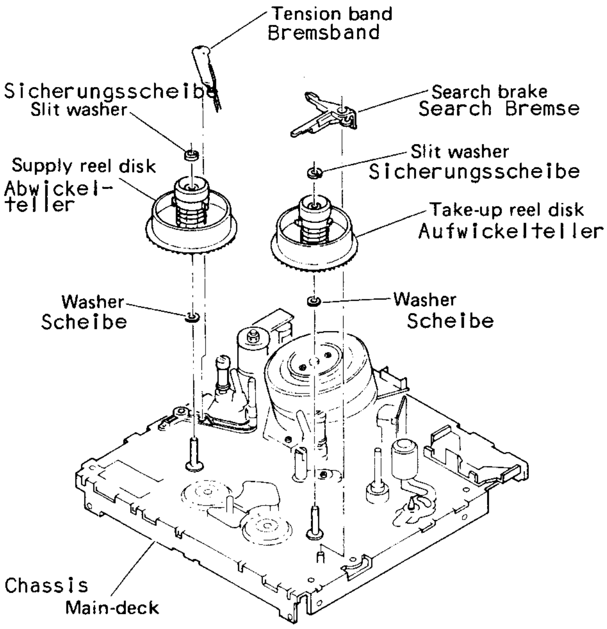

Tension band
Bremsband
Sicherungsscheibe
Slit washer
Search brake
Search Bremse
Supply reel disk
Abwickelteller
Slit washer
Sicherungsscheibe
Take-up reel disk
Aufwickelteller
Washer
Scheibe
Washer
Scheibe
Chassis
Main-deck

Bild 2-12

- Aufwickelteller

1. Lösen Sie die Feder und entfernen Sie die Search-Bremse durch eine Bewegung nach oben.

2. Entfernen Sie die Sicherungsscheibe. Lösen Sie die REW Bremse und nehmen Sie den Aufwickelteller nach oben ab. Achten Sie auf die Unterlegscheiben auf der Wickeltellerunterseite.

3. Reinigen Sie die Wickeltellerachse mit Alkohol, geben Sie vorsichtig einen Tropfen Nähmaschinenöl auf die Achse. Vermeiden Sie zu viel Öl.

4. Erneuern Sie den Aufwickelteller und bauen Sie ihn wieder in umgekehrter Reihenfolge ein.

2.2.8 Ausbau der Kupplungen (siehe Bild 2-13)

- Aufwickeltellerkupplung

1. Entfernen Sie den Aufwickelteller (Abschnitt 2.2.7).

2. Nehmen Sie die Sicherungsscheibe ab und entfernen Sie die Aufwickeltellerkupplung nach oben. Achten Sie auf die Unterlegscheiben unter der Kupplung.

3. Erneuern Sie die Aufwickeltellerkupplung, bauen Sie sie wieder in umgekehrter Reihenfolge ein.

4. Überprüfen Sie den Aufwickelzug nach Abschnitt 2.4.3.

- Abwickeltellerkupplung

1. Entfernen Sie den Abwickelteller (Abschnitt 2.2.2).

2. Nehmen Sie die Sicherungsscheibe ab, entfernen Sie die Abwickeltellerkupplung nach oben. Achten Sie auf die Unterlegscheiben unter der Kupplung.

3. Erneuern Sie die Abwickeltellerkupplung, bauen Sie sie wieder in umgekehrter Reihenfolge ein.

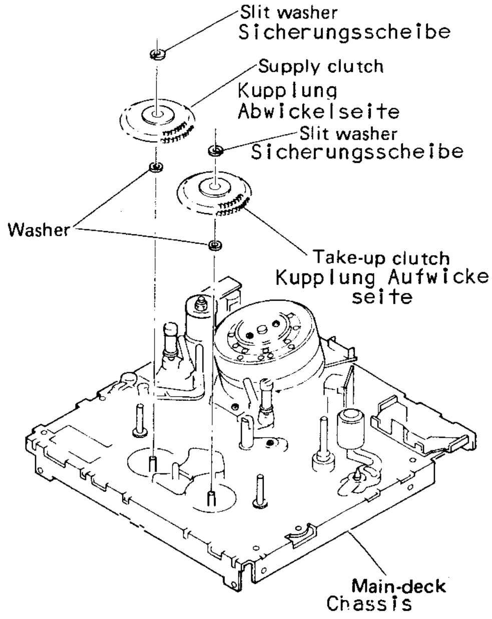

Slit washer
Sicherungsscheibe
Supply clutch
Kupplung
Abwickelseite
Slit washer
Sicherungsscheibe
Washer
Take-up clutch
Kupplung Aufwickelseite
Main-deck
Chassis

Bild 2-13

2.2.9 Ausbau des Erdungsschleifers (siehe Bild 2-14)

1. Lösen Sie die Schraube, entfernen Sie den Erdungsschleifer. Reinigen Sie die Kontaktfläche mit Alkohol.

2. Bauen Sie einen neuen Erdungsschleifer ein. Beachten Sie, daß der Schleifkontakt in der Mitte des Kommutators sitzt.

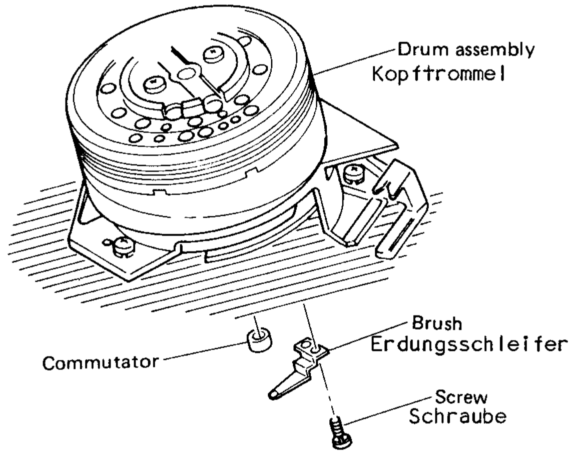

Drum assembly
Kopftrommel
Brush
Erdungsschleifer
Commutator
Screw
Schraube

Bild 2-14

2.2.10 Ausbau des Bremsbandes (siehe Bild 2-15)

1. Lösen Sie die Schraube und das Bremsband vom Fühlhebel.

2. Bewegen Sie die FF-Bremse und nehmen Sie das Bremsband heraus.

3. Bauen Sie ein neues Bremsband ein.

4. Überprüfen Sie die Stellung des Fühlhebels und den Bandzug nach Abschnitt 2.3.2 und 2.3.4.

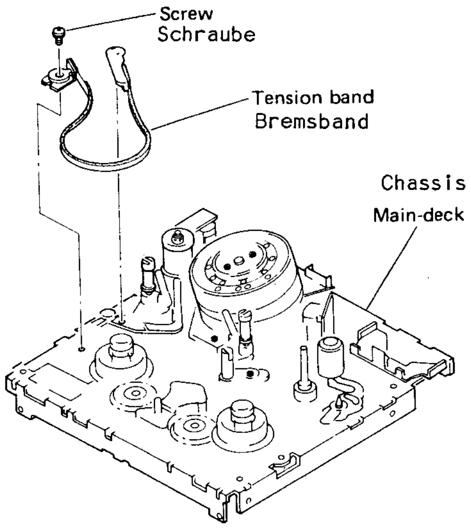

Screw
Schraube
Tension band
Bremsband
Chassis
Main-deck

Bild 2-15

2.2.11 Ausbau des Impulskopfes (siehe Bild 2-16)

1. Ziehen Sie den Stecker CN5 von der Servoplatine ab.

2. Lösen Sie die Schrauben und entfernen Sie den Impulskopf.

3. Erneuern Sie den Impulskopf und bauen Sie ihn in umgekehrter Reihenfolge wieder ein. Prüfen Sie, daß der Kopf in der Mitte der Kopftrommelachse sitzt.

4. Überprüfen Sie den Pegel des Impulskopfes und die Kopfumschaltimpulse nach den Abschnitten 3.5.4, 3.5.6 und 3.5.1.

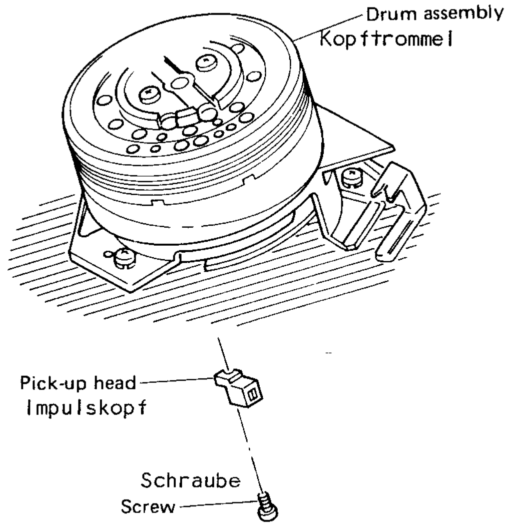

Drum assembly
Kopftrommel
Pick-up head
Impulskopf
Schraube
Screw

Bild 2-16

2.3 Überprüfungen und Einstellungen

2.3.1 Kontrolle der Einfädelfunktion

1. Überprüfen Sie, ob sich der Bolzen auf dem Ladezahnrad gegenüber der Öffnung A des Einfädelringes befindet, wenn der Pfeil (STOP Markierung) auf dem Kurvenrad auf die Mitte der Ladezahnräder zeigt.

2. Überprüfen Sie, daß in der gleichen Stellung die Öffnungen des Ein- und Ausfädelringes mit der Öffnung im Chassis übereinstimmen (siehe Pfeil B in Bild 2-17).

3. Entfernen Sie bei einer Abweichung das Kurvenrad, anschließend das Ladezahnrad und das Zwischenzahnrad 2. Bauen Sie das Ladezahnrad und das Zwischenzahnrad wieder so ein, daß die richtige Position erreicht wird.

4. Stecken Sie ein geeignetes Werkzeug (Inbusschlüssel oder Schraubenzieher) durch die Öffnungen (siehe Pfeil B und C in Bild 2-17), damit das Kurvenrad wieder richtig eingebaut werden kann.

5. Während des Kurvenradeinbaus ist der Fühlhebel in Pfeilrichtung zu bewegen. Das Kurvenrad muß so ausgerichtet werden, daß die Pfeilmarkierung zur Mitte der Ladezahnräder zeigt. In dieser Stellung öffnet sich das Cassettenfach.

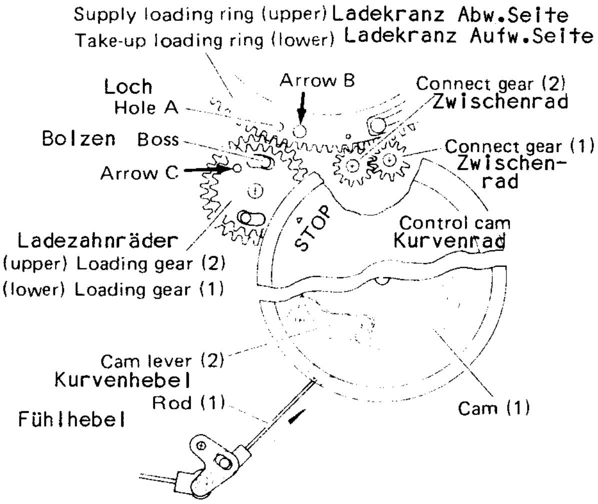

Supply loading ring (upper) Ladekranz Abw.Seite
Take-up loading ring (lower) Ladekranz Aufw.Seite
Loch
Hole A
Arrow B
Connect gear (2)
Zwischenrad
Bolzen Boss
Arrow C
Connect gear (1)
Zwischenrad
STOP
Control cam
Kurvenrad
Ladezahnräder
(upper) Loading gear (2)
(lower) Loading gear (1)
Cam lever (2)
Kurvenhebel
Rod (1)
Fühlhebel
Cam (1)

Bild 2-17

2.3.2 Überprüfung der Position des Bandzugfühlhebels

1. Schalten Sie das Gerät ohne eingelegte Cassette in die Wiedergabebetriebsart.

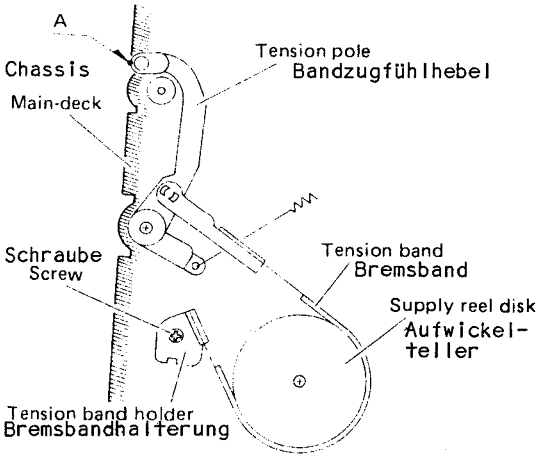

A
Chassis
Main-deck
Tension pole
Bandzugfühlhebel
Schraube
Screw
Tension band
Bremsband
Supply reel disk
Aufwickelteller
Tension band holder
Bremsbandhalterung

Bild 2-18

2. Überprüfen Sie, ob die linke Kante des Fühlhebels (Position A in Bild 2-18) mit der Chassiskante abschließt.

3. Ist dies nicht der Fall, muß die Schraube gelöst und das Bremsband so justiert werden, daß der Fühlhebel die richtige Position einnimmt.

2.3.3 Überprüfen des Aufwickelzuges

1. Schalten Sie das Gerät bei ausgebautem Cassettenfach in die Wiedergabebetriebsart.

2. Setzen Sie eine Drehmomentmeßuhr auf den Aufwickelteller.

3. Halten Sie die Drehmomentmeßuhr so fest, daß sich die Meßnadel mit gleichmäßiger Geschwindigkeit bewegt. Der gemessene Aufwickelzug sollte zwischen 60 und 100 pcm betragen.

4. Sollte dieser Wert nicht erreicht werden, so ist die Aufwickelkupplung und das Zwischenrad zu erneuern (siehe Abschnitt 2.2.8).

2.3.4 Überprüfung des Bandzuges

1. Legen Sie eine Bandmeßcassette ein, schalten Sie das Gerät in die Wiedergabebetriebsart.

2. Überprüfen Sie, ob der Bandzug zwischen 14 und 22 pcm liegt.

3. Wird dieser Wert nicht erreicht, so überprüfen Sie die Position des Bandzugfühlhebels bzw. erneuern Sie das Bremsband. Schwankt der Bandzug stark, erneuern Sie Sie den Abwickelteller (siehe Abschnitt 2.2.10 und 2.2.7).

2.3.5 Überprüfung und Einstellung des Bandtransportsystems

Das Bandtransportsystem wurde im Werk exakt eingestellt. Unter normalen Umständen ist eine Einstellung nicht erforderlich. Die folgenden Überprüfungen sind nur bei Erneuern eines Teils im Bandtransportsystem notwendig.

- Überprüfung des Bandlaufs

1. Legen Sie eine E180 Cassette ein und überprüfen Sie den Bandlauf nach den folgenden Schritten am Bandanfang und -ende.

1.) Überprüfen Sie in der Wiedergabebetriebsart den Bandeinlauf und -auslauf an der Lauffläche der Kopftrommel

(Bild 2-19 und 2-20). Achten Sie darauf, daß das Band nicht über die Führungskanten läuft.

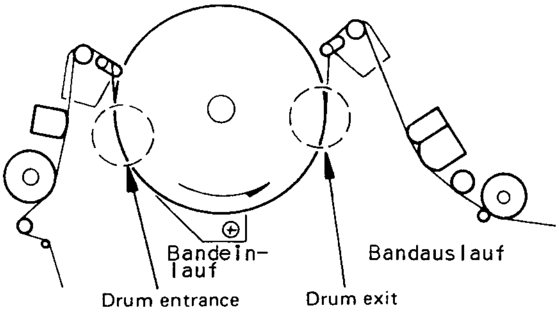

Bandeinlauf
Drum entrance
Bandauslauf
Drum exit

Bild 2-19

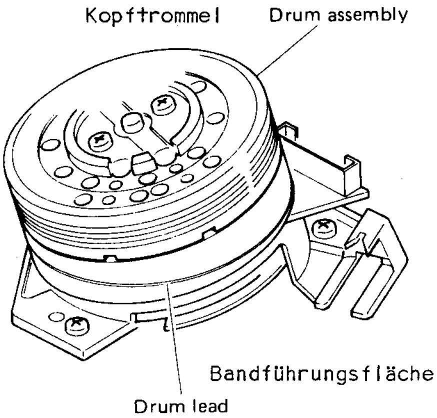
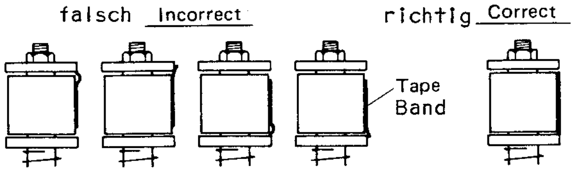

Kopftrommel
Drum assembly
Bandführungsfläche
Drum lead

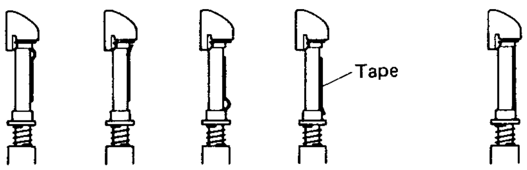
Bild 2-20

2.) Ist der Bandlauf nicht korrekt, so überprüfen Sie die Höheneinstellung der Bandführungsrollen.

3.) Beobachten Sie in der Wiedergabebetriebsart den Bandlauf zwischen Bandberuhigungs- und Bandführungsrolle auf der Aufwickelseite. Das Band darf nicht gestaucht oder gefaltet werden.


falsch Incorrect
richtig Correct
Tape
Band

(a) Impedance roller
Bandberuhigungsrolle



(b) Take-up guide pole
Bandführungsbolzen Aufw.Seite

Bild 2-21

4.) Ist der Bandlauf nicht korrekt, so überprüfen Sie die Höheneinstellung der Bandberuhigungsrolle und die Einstellung des Audio/Synchronkopfes.

2. Schalten Sie am Bandende der E180 Cassette das Gerät in die Betriebsart "Wiedergabe rückwärts".

1.) Überprüfen Sie den Bandlauf am Bandführungsbolzen der Aufwickelseite auf Stauchen und Knittern.

2.) Nehmen Sie die gleiche Überprüfung in der Betriebsart "Bildsuchlauf rückwärts" vor.

3.) Ist der Bandlauf nicht korrekt, so überprüfen Sie den Bandlauf in umgekehrter Richtung.

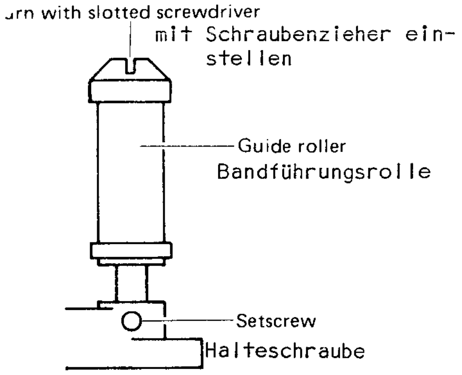
3. Zur Überprüfung und Einstellung der Kompatibilität beachten Sie Abschnitt 2.3.6.

- Höheneinstellung der Bandführungsrollen

1. Lockern Sie die Halteschrauben der Führungsrolle.

2. Legen Sie eine Cassette ein, schalten Sie in die Wiedergabebetriebsart.

3. Drehen Sie mit einem Schraubenzieher vorsichtig an den Bandführungsrollen, bis das Band glatt an den Leitflächen der Kopftrommel bewegt wird. Das Band darf nicht nach oben oder unten weglaufen.


urn with slotted screwdriver
mit Schraubenzieher einstellen
Guide roller
Bandführungsrolle
Setscrew
Halteschraube

Höheneinstellung Bandführungsrolle
Guide roller height adjustment

Bild 2-22

ANMERKUNG:
1. Lösen Sie die Inbusschrauben nur so weit, bis sich die Führungsrollen drehen. Bei übermäßig starker Lockerung kann es dazu kommen, daß die Bandbewegung die Rollen mitbewegt.
2. Drehen Sie vorsichtig an den Führungsrollen, um eine Zerstörung des Bandes zu vermeiden.

- Höheneinstellung der Bandberuhigungsrolle

1. Legen Sie eine Cassette ein, schalten Sie in die Wiedergabebetriebsart.

2. Stellen Sie mit einem Steckschlüssel die Höhe der Bandberuhigungsrolle so ein, daß die Bandunterkante nach dem unteren Flansch der Führungsfläche ausgerichtet wird.

- Neigung des Audio/Synchronkopfes

1. Legen Sie eine Cassette ein, schalten Sie in die Wiedergabebetriebsart.

2. Stellen Sie durch Drehen der Schraube A den A/C Kopf so ein, daß die Unterkante des Bandes nach dem unteren Flansch des Bandführungsbolzens ausgerichtet wird.

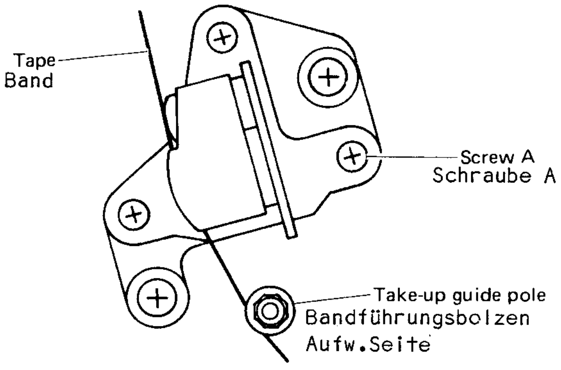

Tape
Band
Screw A
Schraube A
Take-up guide pole
Bandführungsbolzen
Aufw.Seite

Bild 2-23

ANMERKUNG: Verstellen sie nicht die Höhe des Bandführungsbolzens.

- Bandlauf in umgekehrter Richtung

1. Legen Sie eine E180 Cassette mit mit vollem Aufwickelteller und leerem Abwickelteller ein. Schalten Sie das Gerät in die Betriebsart "Wiedergabe rückwärts".

2. Stellen Sie mit der Halteschraube den Bandführungsbolzen vor der Andruckrolle auf glatten Bandlauf ein.

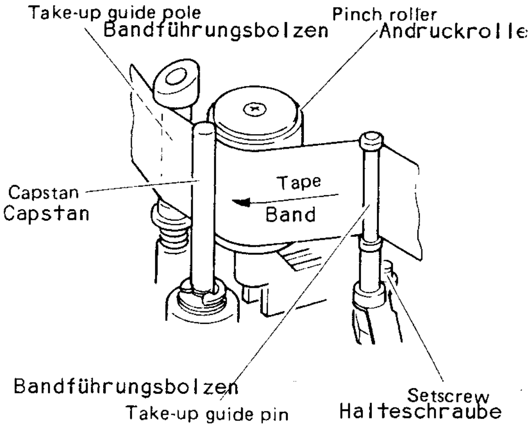

Take-up guide pole
Bandführungsbolzen
Pinch roller
Andruckrolle
Capstan
Capstan
Tape
Band
Bandführungsbolzen
Take-up guide pin
Setscrew
Halteschraube

Bild 2-24

ANMERKUNG: Lassen Sie nach dem Lösen der Schraube eine Zeit von 2 bis 3 sec verstreichen, bevor Sie den Bandführungsbolzen einstellen.

3. Überprüfen Sie den Bandlauf in der Betriebsart "Bildsuchlauf rückwärts" auf Stauchen und Knittern.

4. Wiederholen Sie ggf. die Punkte 1 und 2.

2.3.6 Überprüfen und Einstellen der Kompatibilität

Bevor Sie ein Abgleichband einlegen, überprüfen Sie den Bandlauf mit einer normalen Cassette.

- Überprüfen und Einstellen der FM-Hüllkurve

1. Schließen Sie einen Oszillografen an den Testpunkt TP-PB. FM (FM OUT) auf der Servoplatine an. Triggern Sie den Oszillografen extern mit dem Signal von TP-11 (DRUM F.F.) auf der Servoplatine.

2. Spielen Sie den Grautreppenanteil des Abgleichbandes MH-2 ab.

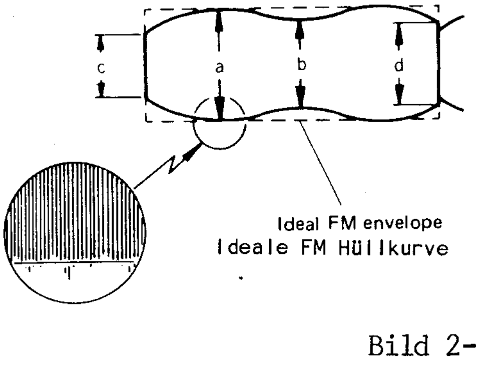

c
a
b
d
Ideal FM envelope
Ideale FM Hüllkurve

Bild 2-25

1.) Stellen Sie mit dem Tracking Einsteller die Hüllkurve auf ihre max. Amplitude ein (Bild 2-25). Beobachten Sie den Verlauf der Hüllkurve. Vergleichen Sie den max. Pegel (a) mit dem min. Pegel (b,c,d). Prüfen Sie die Verhältnisse nach:

$$\frac{b}{a} \geqq 0{,}7 \;,\; \frac{c}{a} \geqq 0{,}5 \;,\; \frac{d}{a} \geqq 0{,}5$$

ANMERKUNG: Ist die Hüllkurve sehr wellig, bewerten Sie die Werte bei der gleichförmigsten Stelle.

2.) Stellen Sie mit dem Tracking Einsteller die Hüllkurve auf ihr Maximum und ihr Minimum. Die Abweichung der Signalform muß annähernd der in Bild 2-26 gezeigten Form entsprechen.

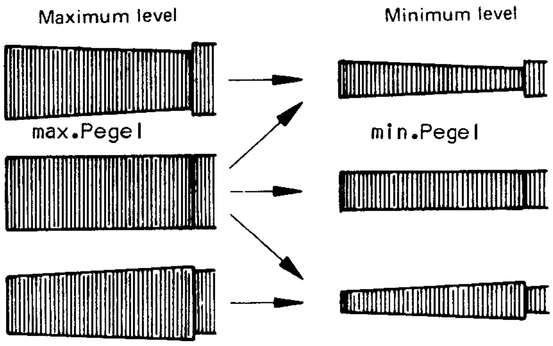


Bild 2-26

3.) Bei korrektem Ergebnis fahren Sie mit der Einstellung des Audio/Synchronkopfes fort.

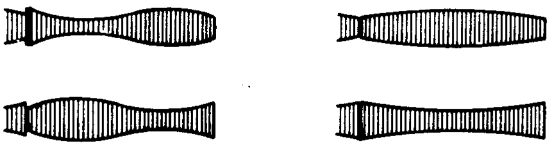


Bild 2-27

4.) Bei unbefriedigendem Ergebnis nehmen Sie folgende Einstellungen vor.

3. Lösen Sie die Halteschrauben der beiden Bandführungsrollen. Wenn sich die Führungsrollen frei drehen, ziehen Sie die Halteschrauben wieder leicht an.

4. Spielen Sie den Grautreppenteil des Abgleichbandes MH-2 ab.

5. Stellen Sie mit dem Tracking Einsteller die FM Hüllkurve auf Maximum ein.

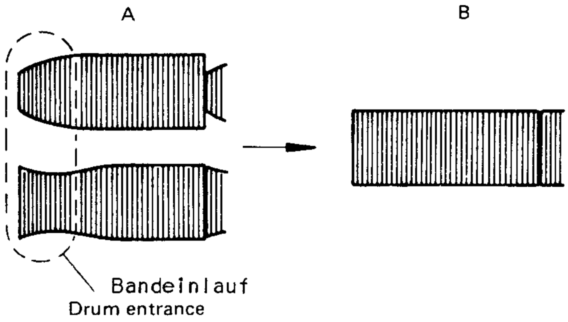


Bild 2-28

1.) Teil A in Bild 2-28 zeigt einen unkorrekten Bandeinlauf. Stellen Sie mit einem Schraubenzieher die Bandführungsrolle auf der Abwickelseite so ein, daß die Hüllkurve die Form von Teil B annimmt.

2.) Stellen Sie auf die gleiche Weise wie beim Bandeinlauf die Bandführungsrolle auf der Aufwickelseite ein. Teil C in Bild 2-29 zeigt einen unkorrekten Bandeinlauf. Teil D zeigt eine Hüllkurve bei richtig eingestellten Bandführungsrollen.

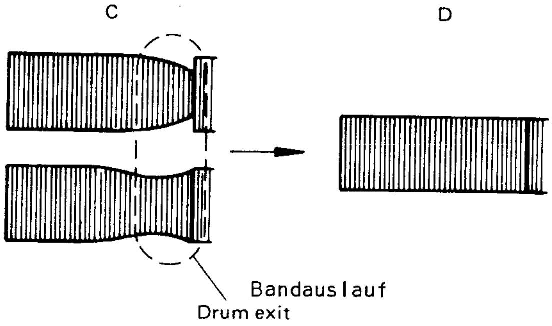


Bild 2-29

3.) Überprüfen Sie nochmals den einwandfreien Bandlauf an der Bandberuhigungsrolle und am Bandführungsbolzen nach dem A/C Kopf. Kommt es zum Abheben des Bandes von der Führung an der Bandberuhigungsrolle, so überprüfen Sie die Höheneinstellung der Bandberuhigungsrolle.
Kommt es zum Abheben des Bandes an der Führung des Bandführungsbolzens, so überprüfen Sie die Einstellung des Bandführungsbolzens.

6. Beobachten Sie den Verlauf der Hüllkurve und stellen Sie mit dem Tracking Einsteller die Hüllkurve auf Minimum.

1.) Zeigt die Hüllkurve einen Verlauf nach Teil A, B, C und D in Bild 2-30, so stellen Sie vorsichtig an den Bandführungsrollen, bis die Form E, F oder G erreicht wird.

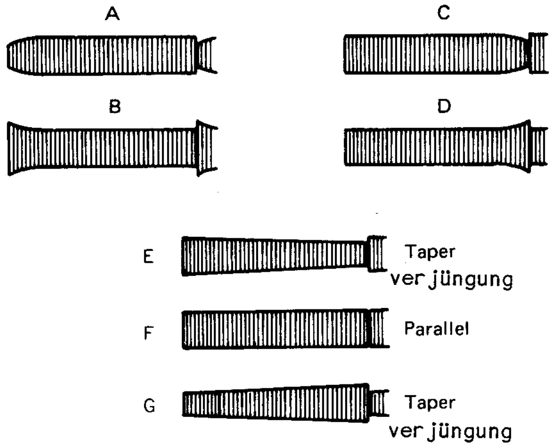


Bild 2-30

ANMERKUNG: Kommt es jetzt zu Schwankungen der Hüllkurve, so stellen Sie auf min. Schwankungen ein.

2.) Variieren Sie die Amplitude der FM-Hüllkurve, nehmen Sie eine Feineinstellung der Bandführungsrolle vor.

- Azimut- und Höheneinstellung des Audio/Synchronkopfes (s. Bild 2-31)

Eine falsche Höheneinstellung kann bei fremdbespielten Cassetten zu einem schlechten Signal/Rauschverhältnis führen.

1. Schließen Sie einen Oszillografen an CN2-2 auf der Audioplatine an.

2. Spielen Sie den 6 kHz Teil (Grautreppe) der MH-2 Abgleichcassette ab.

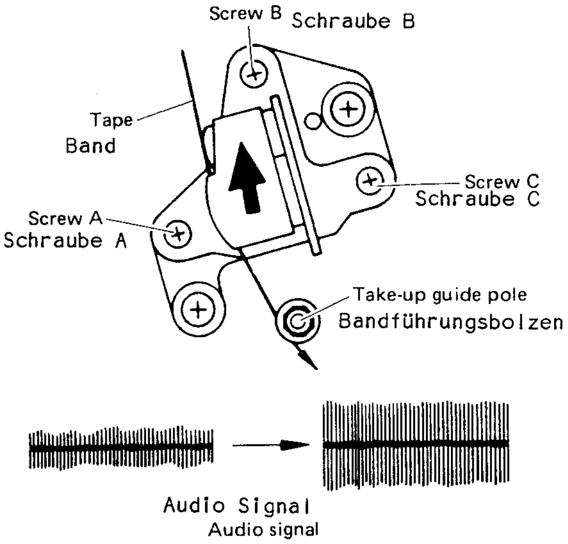


Bild 2-31

1.) Stellen Sie mit den Schrauben A, B und C die Höhe und die Neigung des A/C Kopfes so ein, daß ein max. Audiosignal erreicht wird. Zur Feineinstellung wird Schraube A nicht mehr verdreht. Die Neigung nach vorne/hinten wird mit der Schraube C, der Azimut mit der Schraube B eingestellt. Wiederholen Sie die Einstellung, bis die Pegelschwankungen ein Minimum erreicht haben.

- Festziehen der Halteschrauben

1. Kontrollieren Sie, ob die bestmögliche FM-Hüllkurve sowie ein max. Audiopegel erreicht worden ist.
Ziehen Sie die Schrauben in der STOP Position an.
ANMERKUNG: Da sich die Führungsrollen leicht bewegen, sollen Sie beim Sichern vorsichtig vorgehen.

2. Führen Sie eine Schlußkontrolle durch.

- Phaseneinstellung des Audio/Synchronkopfes (siehe Bild 2-32)

1. Schließen Sie einen Oszillografen an TP-PB FM auf der Servoplatine an. Triggern Sie den Oszillografen extern mit dem Signal von TP-11 der Servoplatine.

2. Spielen Sie den Grautreppenteil der MH-2 Abgleichcassette ab.

3. Triggern Sie mit der negativen Flanke und beobachten Sie die Hüllkurve des CH-1 Kopfes.

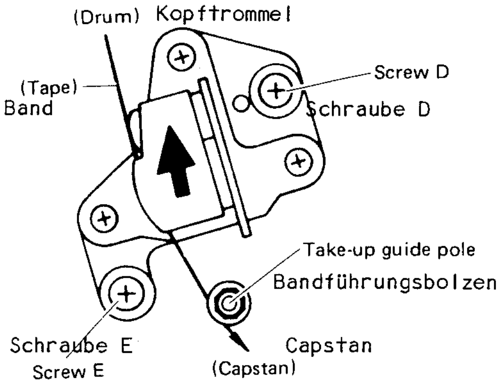

(Drum) Kopftrommel
(Tape) Band
Screw D
Schraube D
Take-up guide pole
Bandführungsbolzen
Schraube E
Screw E
Capstan
(Capstan)

Bild 2-32

- Mitteleinstellung des Tracking-Einstellers

1. Stellen Sie den Tracking-Einsteller in seine Mittelstellung.

2. Lösen Sie die Schrauben D und E, schieben Sie den A/C Kopf bis zum Anschlag in Richtung Capstan.

3. Ziehen Sie die Schrauben wieder leicht an.

4. Bei Erreichen des ersten Maximums der FM-Hüllkurve ist die optimale Position erreicht. Ziehen Sie die Schrauben fest an.

- Einstellen der Servoschaltung

1. Überprüfen Sie die Einstellung des PB/REC Kopfumschaltsignals nach Abschnitt 3.5.4 und 3.5.5.

- Endprüfung

1. Schließen Sie einen Oszillografen an TP-PB FM auf der Servoplatine an. Triggern Sie den Oszillografen extern mit dem Signal von TP-11 auf der Servoplatine.

1.) Nehmen Sie ein Videosignal auf und geben Sie anschließend die Aufnahme wieder. Kontrollieren Sie, ob die Hüllkurve die gleiche Form wie bei der Wiedergabe der MH-2 Abgleichcassette hat.

2.) Überprüfen Sie alle Einstellungen der Servo- und Videoschaltung.

3.) Überprüfen Sie die Einstellungen der Audioschaltung.

3. ELEKTRISCHE EINSTELLUNGEN

3.1 Vorbereitungen

Elektrische Einstellungen sind erforderlich, wenn Bauteile oder in einigen Fällen auch mechanische Teile ausgetauscht werden. Die Einstellarbeiten sollten erst begonnen werden, wenn der Austausch von Ersatzteilen abgeschlossen ist. Auch sollte ein Abgleich unterlassen werden, falls die erforderlichen Meßeinrichtungen dafür nicht vorhanden sind.

3.2 Erforderliche Meßgeräte

1. Farbmonitor
2. Zweikanaloszillograf mit einer Bandbreite von >20 MHz
3. Farbbalkengenerator
4. Frequenzzähler
5. Audio Tester (Generator und Millivoltmeter)
6. Digital Multimeter
7. regelbares Gleichspannungsnetzgerät 0-12V
8. Videocassette

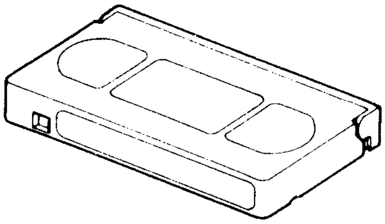
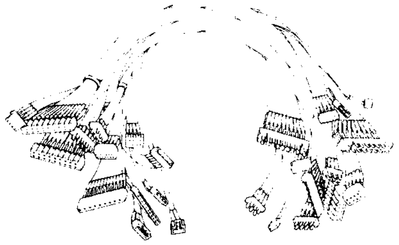
9. MH-2 
10. Patch Cord PUJ36857 

Tabelle 3-1

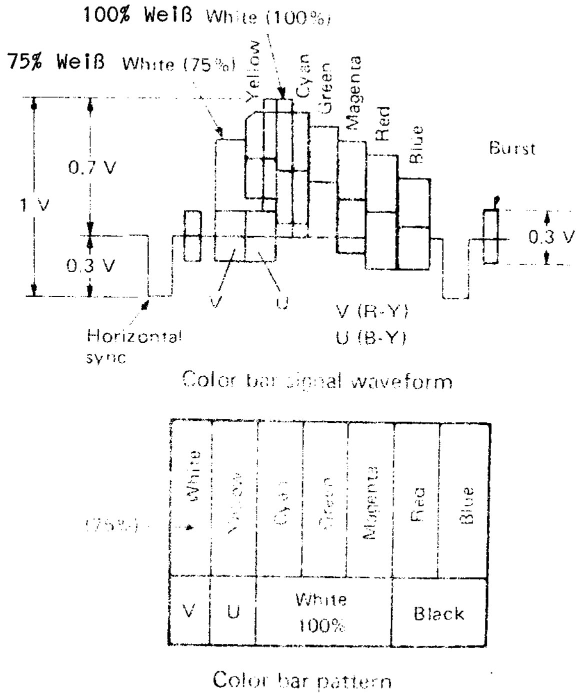

100% Weiß White (100%)
75% Weiß White (75%)
Yellow
Cyan
Green
Magenta
Red
Blue
Burst
0.7 V
1 V
0.3 V
0.3 V
V
U
V (R-Y)
U (B-Y)
Horizontal sync
Color bar signal waveform
(75%)
White
Yellow
Cyan
Green
Magenta
Red
Blue
V
U
White 100%
Black
Color bar pattern

Bild 3-2

Farbbalkenfolge von Abgleichband MH-2. Herkömmliche Farbbalkengeneratoren haben eine durchgehende Balkenfolge. Es ist darauf zu achten, daß der abgegebene Weißbalken 100% Weiß enthält.

3.2.1 Inhalt des Abgleichbandes MH-2

Teil	Spielzeit	Videosignal	Audio	Anwendung
1	10 min.	Graubalken (stairsteps)	6 kHz	-Einstellung der Kompatibilität -Servoeinstellungen -Azimuteinstellung d. A/C Kopfes
2	5 min.	Rauschen (none)	3 kHz	-Prüfen der Bandgeschwindigkeit -Gleichlauftest
3	10 min.	Farbbalken (color bar)	1 kHz 0 dB	-Prüfen der Videoschaltung -Prüfen der Audioschaltung
4	3 min.	Wobbelsignal (RF sweep)	Rauschen	-Videokopfresonanz -Marken: 2, 4, 5 MHz

3.3 Einstellung des Schaltreglernetzteils (Videoplatine)

3.3.1 5,25 V DC Ausgangsspannung

Betriebsart : Aufnahme
Digitalvoltmeter : TP401, TP402
DC Netzgerät : 12 V Batterieanschluß

1. Stellen Sie mit R405 5,75 V an TP 401 und mit R408 5,25 V an TP402 ein.

3.4 Einstellen der MECHACON Schaltung (MECHACON Platine)

3.4.1 Batteriealarm

Betriebsart : STOP
Digitalvoltmeter : TP1, TP2
DC Netzgerät : 12 V Batterieanschluß

1. Stellen Sie R28 so ein, daß der Batteriealarm bei einer Spannung von 11 V an TP1 ausgelöst wird.
2. Stellen Sie die Spannungen an TP1 auf 11 V ein.
3. Stellen Sie R28 so ein, daß die ansteigende Spannung an TP2 (IC3-8) "H" Pegel annimmt.

3.5 Einstellen der Servoschaltung (Servoplatine)

3.5.1 Impulspegel der Kopftrommelabtastung

Betriebsart : Aufnahme
Signal : Farbbalken
Oszillogarf : TP6

ANMERKUNG: Der Kopftrommelservo muß synchronisiert sein.

1. Stellen Sie R97 so ein, daß der positive und der negative Impuls eine Amplitude von 0,7 ± 0,1 V_{SS} erreicht.

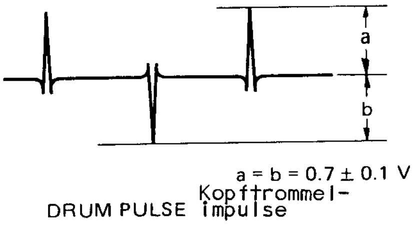

a
b
a = b = 0.7 ± 0.1 V
DRUM PULSE
Kopftrommel-Impulse

Bild 3-3

3.5.2 Capstan-Diskriminator

Betriebsart : Aufnahme
Signal : Farbbalken
Oszillograf : TP3

1. Schließen Sie TP22 nach Masse kurz.

2. Stellen Sie mit R15 den Sampling-Impuls in die Mitte der ansteigenden Impulsflanke. Eine Drift von 40 msec innerhalb von 5 sec ist akzeptabel.

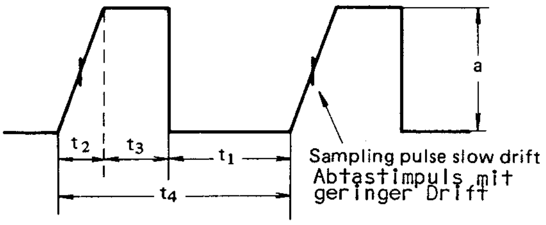

a
t_2
t_3
t_1
t_4
Sampling pulse slow drift
Abtastimpuls mit geringer Drift

Bild 3-4

3. Überprüfen Sie folgende Verhältnisse:

$a \geq 5.0$ V
$t_2 = 3.2 \pm 0.5$ msec
$t_1/t_3 = 1$
$t_4 = 40$ msec

3.5.3 Kopftrommel-Diskriminator

Betriebsart : Aufnahme
Signal : Farbbalken
Oszillograf : TP7

1. Schließen Sie TP21 nach Masse kurz.

2. Stellen Sie mit R69 den Sampling-Impuls in die Mitte der abfallenden Impulsflanke.

3. Überprüfen Sie folgende Verhältnisse:

$a > 5.0$ V
$t_2 = 3.2 \pm 0.5$ msec
$t_2/t_1 = 1$
$t_3 = 40$ msec

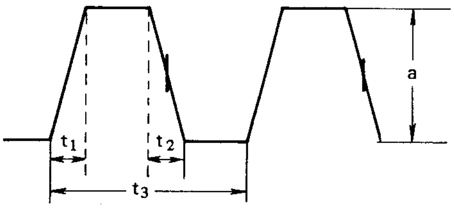


Bild 3-5

3.5.4 Kopfumschaltimpuls bei Wiedergabe

Betriebsart : Wiedergabe
Signal : MH-2 Grautreppe
Oszillograf : Video Ausgang

1. Triggern Sie den Oszillografen extern mit der negativen Flanke des Signals von TP-11 der Servoplatine.

2. Stellen Sie mit R95 den Triggerpunkt auf 6,5 ± 0,5 Zeilen vor dem V-Synchronimpuls ein.

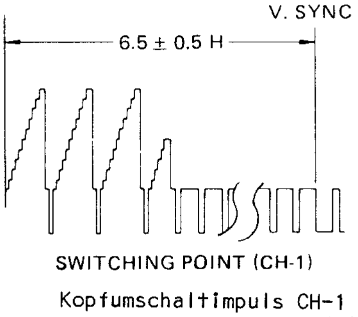

V. SYNC
6.5 ± 0.5 H
SWITCHING POINT (CH-1)
Kopfumschaltimpuls CH-1

Bild 3-6

3. Triggern Sie mit der positiven Flanke.

4. Stellen Sie mit R93 den Triggerpunkt auf 6,5 ± 0,5 Zeilen vor dem V-Synchronimpuls ein.

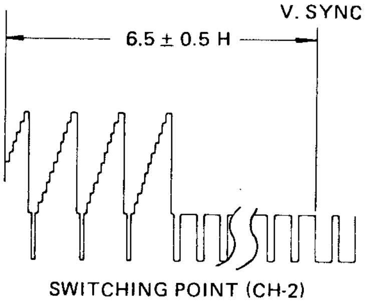

V. SYNC
6.5 ± 0.5 H
SWITCHING POINT (CH-2)

Bild 3-7

3.5.5 Kopfumschaltimpuls bei Aufnahme

Betriebsart : Aufnahme
Signal : Grautreppe
Oszillograf : Video Ausgang

1. Triggern Sie den Oszillograf extern mit der positiven Flanke des Impulses von TP-11 auf der Servoplatine.

2. Stellen Sie mit R47 den Triggerpunkt auf 6,5 ± 0,5 Zeilen vor dem V-Synchronimpuls ein.

3.5.6 Tracking-Voreinsteller

Betriebsart : Eigenaufnahme, dann Wiedergabe
Signal : Grautreppe

1. Stellen Sie den Tracking-Einsteller (R36) in die Klick-Position.

2. Versuchen Sie mehrere Aufnahme-Wiedergabezyklen.

3. Stellen Sie mit R38 die vertikale Linie so weit wie möglich über den Kopfumschaltimpuls.

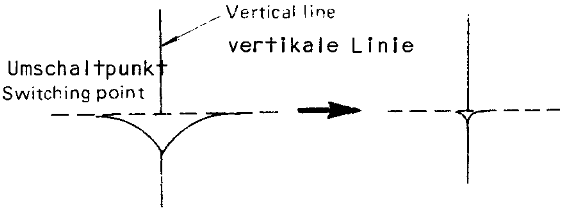


Bild 3-8

4. Überprüfen Sie nach dieser Einstellung die des Kopfumschaltimpulses.

3.5.7 Position des Audio Synchronkopfes

Siehe Abschnitt 2.3.6.

3.5.8 Tracking-Voreinsteller für "Wiedergabe rückwärts"

Betriebsart : Aufnahme, dann Wiedergabe rückwärts
Signal : Farbbalken

1. Stellen Sie den Tracking-Einsteller in die Klick-Position.

2. Stellen Sie mit R28 den Rauschbalken an die Unterseite des Bildschirms, aber vermeiden Sie eine Zerstörung der H-Synchronisation am oberen Bildrand.

3.5.9 H-Diskriminator

Betriebsart : Bildsuchlauf vorwärts/rückwärts
Signal : MH-2 Farbbalken

1. Stellen Sie mit R59 den Monitorbildschirm auf minimalste Farbtonabweichung ein.

3.5.10 V-Impuls

Betriebsart : Aufnahme, dann Standbildwiedergabe
Signal : Farbbalken
Oszillograf : Video Ausgang

1. Triggern Sie den Oszillogarfen extern mit dem Signal von TP11 der Servoplatine.

2. Stellen Sie mit R101 die Zeit t_2 auf 100 ± 20 µsec ein.

3. Stellen Sie mit R103 die Zeit t_3 auf 250 ± 50 µsec ein.

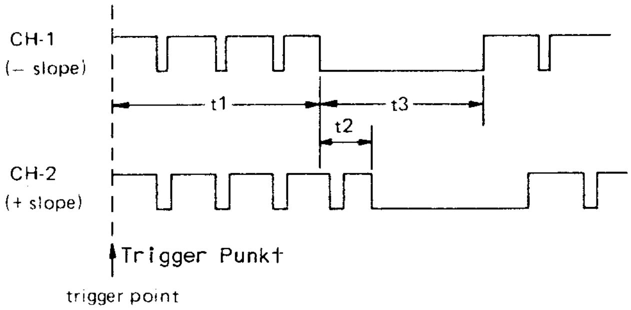


Bild 3-9

ANMERKUNG: Steht das Fernsehgerät des Kunden zur Verfügung, so stellen Sie R101 (durch ein Loch an der Geräterückseite zugänglich) auf minimales vertikales Zittern ein.

3.6 Einstellen der Videoschaltung (Videoplatine)

3.6.1 Kopfresonanz und Güte

Diese Einstellung ist nur bei Wechsel der oberen Kopftrommel notwendig. Sollte eine Einstellung notwendig sein, so kann sie mit Hilfe der MH-2 Abgleichcassette oder mit Hilfe eines Wobbelgenerators vorgenommen werden. Im folgenden sind beide Methoden beschrieben:

A : Wobbelgenerator

1. Schalten Sie das Gerät in die Wiedergabebetriebsart ohne eingelegte Cassette. Schließen Sie den Oszillografen an Pin 8 von IC3 an.

2. Schließen Sie den Wobbelgenerator an TP1 und TP2 an.

3. Stellen Sie mit C13 die Resonanzüberhöhung auf die 5 MHz Marke ein.

4. Stellen Sie mit den Einstellern R1 und R2 das Verhältnis zwischen der 1 MHz und der 5 MHz Marke auf 1:2,5 (siehe Bild 3-10).

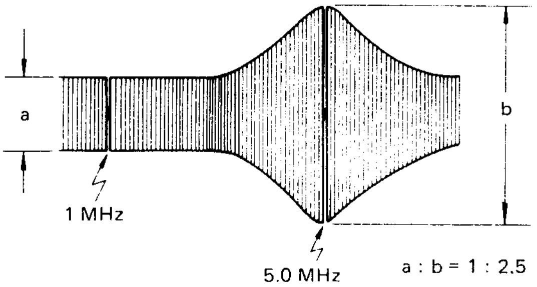


Bild 3-10

B : Abgleichcassette MH-2

1. Legen Sie die MH-2 Cassette ein und spielen Sie den 4. Teil (RF sweep) ab.

2. Schließen Sie den Oszillografen an Pin 8 von IC3 an.

3. Stellen Sie mit C13 und C14 die Resonanzüberhöhung auf die 5 MHz Marke ein (siehe Bild 3-11).

4. Sind die Amplituden der beiden Kanäle unterschiedlich, so passen Sie den stärkeren Kanal mit R1 und R2 an den schwächeren Kanal an.

5. Nehmen Sie ein Videosignal auf. Prüfen Sie anschließend die Wiedergabe auf Flackern oder schwarz-weiß Umkehrungen. Falls erforderlich, ändern Sie geringfügig die Einstellung von R1 und R2.

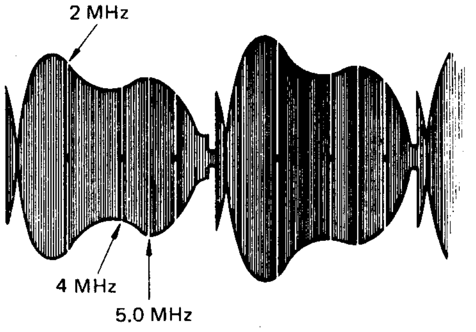


Bild 3-11

3.6.2 Video E-E Pegel

Betriebsart : E-E
Signal : Farbbalken
Oszillograf : Video Ausgang

1. Stellen Sie mit R80 einen Pegel von 0,92 ± 0,03 V_{SS} bei 75 Ohm Abschluß ein.

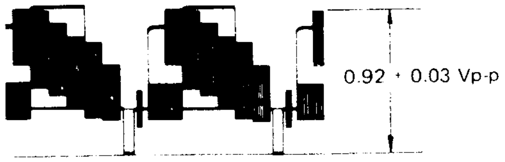


Bild 3-12

3.6.3 FM-Träger und Hub

WICHTIG!
Diese Einstellung ist gewöhnlich nur nach Austausch von IC7 auf der Videoplatine erforderlich.

ANMERKUNG: Stellen Sie vor den Abgleich R140 (DARK CLIP) auf Anschlag im Gegenuhrzeigersinn und R152 (WHITE CLIP) auf Anschlag im Uhrzeigersinn. Das Signal darf nicht begrenzt werden.

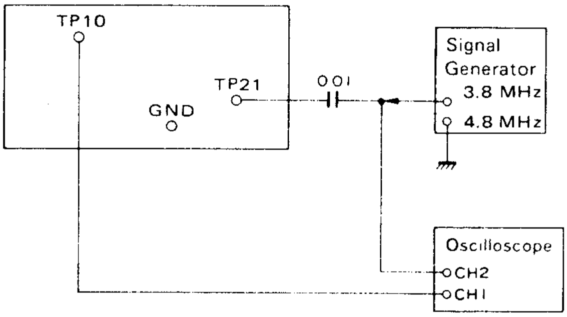


Bild 3-13

Betriebsart : E-E
Signal : Farbbalken
Eingangswahlschalter : Stellung AUX

1. Schließen Sie die erforderlichen Geräte nach Bild 3-13 an.

2. Schalten Sie den Oszillografen in die ADD Funktion und stellen Sie Y-Verstärkung und Signalgeneratorausgang auf leichte Übertragung.

3. Stellen Sie den Signalgenerator auf 3,8 MHz ein, stellen Sie mit R111 (CARRIER) den Träger nach Bild 3-14 ein.

4. Stellen Sie den Signalgenerator auf 4,8 MHz ein, stellen Sie mit R110 (DEVIATION) den Hub nach Bild 3-14 ein.

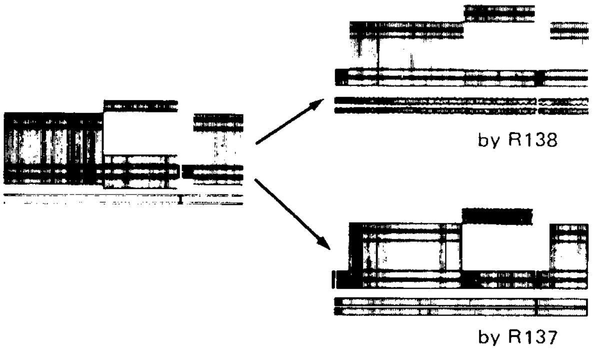


Bild 3-14

3.6.4 Weiß- und Schwarz-Begrenzung

Betriebsart : E-E
Signal : Farbbalken 100% Weiß
Oszillograf : TP3
Eingangswahlschalter : Stellung AUX

1. Stellen Sie mit R84 (WHITE CLIP) die Begrenzung der Weißspitze auf 90% ein.

2. Stellen Sie mit R113 (DARK CLIP) die Begrenzung auf 45% ein (siehe Bild 3-15).

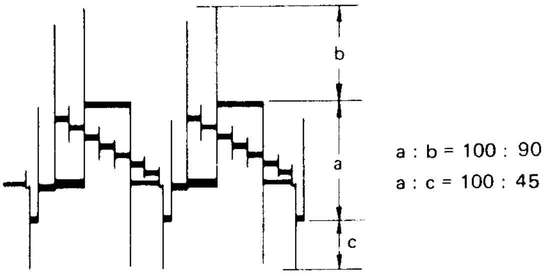


Bild 3-15

3.6.5 AFC

Betriebsart : E-E
Signal : Farbbalken
Frequenzzähler : TP212

1. Schalten Sie zwischen die Testpunkte TP203 und TP221 ein RC Glied nach Bild 3-16.

2. Stellen Sie mit R222 eine Frequenz von 625 kHz ± 5 kHz ein.

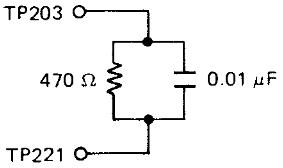


Bild 3-16

3.6.6 VXO (Variabler Quarzoszillator)

Betriebsart : Wiedergabe
Signal : Abgleichcassette MH-2
Farbbalken
Frequenzzähler : TP225

1. Stellen Sie mit R220 eine Frequenz von 4,433619 MHz - 50 Hz ein.

3.6.7 FM Aufnahmepegel

Betriebsart : Aufnahme
Signal : Farbbalken
Oszillograf : TP4

1. Stellen Sie R86 so ein, daß der Pegel der FM Wellenform 3,5 V_{SS} beträgt.

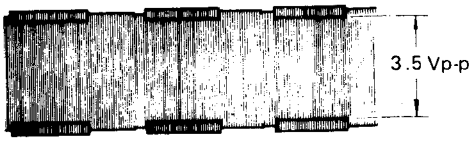


Bild 3-17

3.6.8 Color Aufnahmepegel

Betriebsart : Wiedergabe
Aufnahme, dann Wiedergabe
Signal : Abgleichcassette MH-2
Farbbalken
Oszillograf : TP204
Eingangswahlschalter : Stellung AUX

1. Legen Sie die Abgleichcassette MH-2 ein, schalten Sie auf Wiedergabe und beobachten Sie den Farbsignalpegel.

2. Triggern Sie den Oszillografen extern mit der negativen Flanke des Signals von TP11 auf der Servoplatine.
Stellen Sie R201 während der Aufnahme einer normalen Cassette so ein, daß der Pegel bei anschließender Wiedergabe 10% größer als der der Abgleichcassette ist.

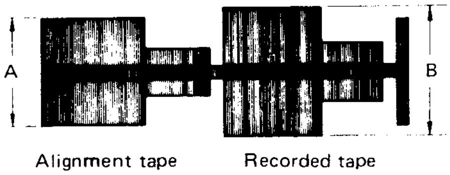


Bild 3-18

3.6.9 Konverter Balance

Betriebsart : Aufnahme, dann Wiedergabe
Signal : Farbbalken
Oszillograf : TP201
Eingangswahlschalter : Stellung AUX
Oszillograf Trigger : TP11 Servoplatine

1. Stellen Sie mit R239 einen Minimum-Restträger von 5,06 MHz ein.

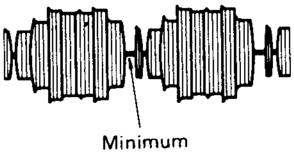


Bild 3-19

3.6.10 Rauschunterdrückungsbalance

Betriebsart : Aufnahme, dann Wiedergabe
Signal : Grautreppe
Oszillograf : TP21

1. Stellen Sie mit R18 eine flache Wellenform ein.

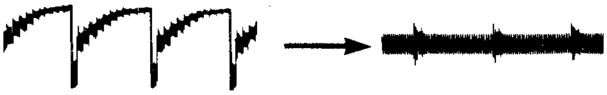


Bild 3-20

3.6.11 Wiedergabe Y-Pegel und Burst-Pegel

Betriebsart : Aufnahme, dann Wiedergabe
Signal : Farbbalken
Oszillograf : Video Ausgang oder TP10
Eingangswahlschalter : Stellung AUX

1. Schließen Sie den Videoausgang mit 75 Ohm ab, stellen Sie mit R14 einen Y-Signalpegel von 0,92 V ± 0,05 V_{ss} ein.

2. Stellen Sie mit R243 einen Burst-Pegel von 0,27 V ± 0,05 V_{ss} ein (s. Bild 3-21).

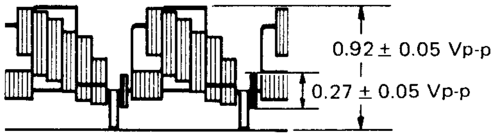


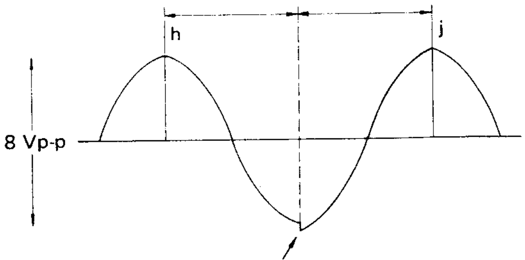
Bild 3-21

3.6.12 SECAM Detektor

Betriebsart : E-E
Signal : SECAM Farbbalken
Oszillograf : TP223
Eingangswahlschalter : Stellung AUX

1. Schließen Sie den Oszillografen an T223 an, stellen Sie mit R257 eine Signalamplitude von 8,0 V_{ss} ein.

2. Stellen Sie den Übertrager L213 nach der Signalform in Bild 3-22 ein.



This point set to center between h and j point.

Setzen Sie diesen Punkt zwischen die punkte h und j

Bild 3-22

3.7 Einstellen der Audio Schaltung (Audioplatine)

3.7.1 Audio Wiedergabepegel

Betriebsart : Wiedergabe
Signal : Abgleichcassette MH-2 1 kHz Teil
Oszillograf : Audio Ausgang

1. Stellen Sie mit R12 einen Pegel von o dB (2,2 V_{SS}) ein.

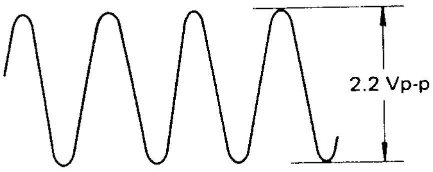


Bild 3-23

3.7.2 Vormagnetisierungspegel

Betriebsart : Aufnahme
Signal : kein Signal
Digital Voltmeter : an beiden Seiten von R1 auf der A/C Kopfplatine (CN1-1,2)

1. Stellen Sie mit R31 eine Spannung von 4,4 - 0,2 mV ein.

3.7.3 Audio Aufnahmepegel

Betriebsart : Aufnahme, dann Wiederagbe
Signal : 1 kHz, -10 dBs, VIDEO: Farbbalken
Oszillograf : Audio Ausgang
Eingangswahlschalter : Stellung AUX

1. Stellen Sie während der Aufnahme mit R17 einen Pegel von 0 dB (2,2 V_{SS}) ein.

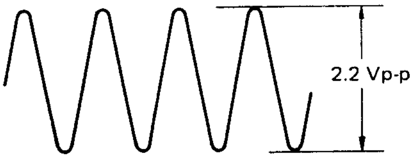


Bild 3-24

3.7.4 Audio Frequenzgang

Betriebsart : Aufnahme, dann Wiedergabe
Signal : 1 kHz, 10 kHz, 100 Hz, -18 dBs, VIDEO: Farbbalken
Oszillograf : Audio Ausgang
Eingangswahlschalter : Stellung AUX

1. Stellen Sie R31 während der Aufnahme so ein, daß bei der anschließenden Wiedergabe der 10 kHz Pegel ± 3 dB und der 100 Hz Pegel ± 0,5 dB von der Bezugsfrequenz 1 kHz abweichen.